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DANA

Instruction Manual

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DAN 4800

MODEL 4800 DIGITAL VOLTMETER

Publication
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PRELIMINARY MANUAL

MODEL 4800

DIGITAL VOLTMETER

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DANA

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Warranty

Within one year of purchase, Dana Laboratories will repair or replace, at our option, your instrument if in any way it is defective in material or workmanship. All parts and labor charges will be paid by Dana Laboratories. Just return the instrument to your nearest authorized Dana Service Center freight prepaid. We will return it to you freight prepaid.

DANA

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SECTION 1

INTRODUCTION

1.1 GENERAL DESCRIPTION.

1.2 The Dana Model 4800 Digital Voltmeter is a four-digit instrument with a fifth decade providing 100% overrange on all functions except AC (700V RMS max.) and DC (1000V max.).

1.3 The instrument (with accessories) measures DC volts, DC millivolts, Ohms, AC volts, and ratios. Both manual and automatic ranging are provided. In Autorange, the instrument upranges at 200% of full scale and downranges at 10% of full scale. Polarity selection is automatic and is displayed on the readout.

1.4 Two operating modes are provided. In Single Read mode, a reading is held until a single reading is commanded by a front panel pushbutton switch. That reading is then held until the switch is again activated. In Periodic mode, readings are taken automatically at the rate of three and one-third per second.

1.5 A Program Control switch on the front panel places the instrument under remote control in which all commands are received through the program input connector. A BCD output is provided to an external printer or other output device.

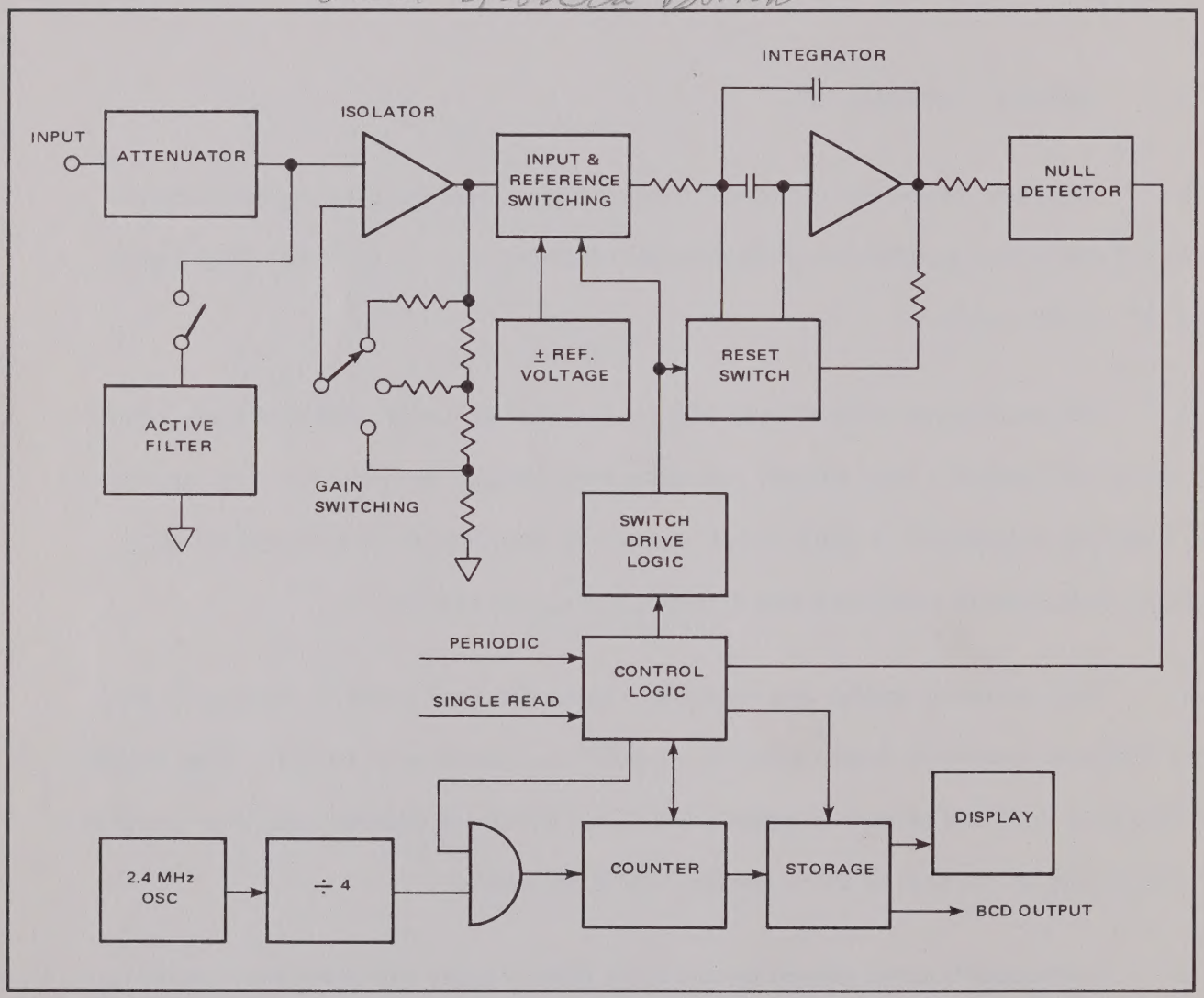


Figure 1.2 - Block Diagram

1.6 ELECTRICAL DESCRIPTION.

1.7 A block diagram of the Model 4800 is shown in figure 1.2. A dc input signal is applied through the attenuator (voltage divider) to the Isolator amplifier. Ranging is accomplished by the voltage division of the attenuator combined with the gain of the Isolator. The Isolator output is a ten-volt full scale (20 volts in overrange) analog voltage representing the input.

1.8 For AC measurements, the signal is first applied to the AC Converter where it is scaled, rectified, and filtered. The resulting d-c voltage is then applied to the attenuator and measured as DC.

1.9 To measure resistance, an Ohms Converter is used. The Ohms Converter generates a current that is applied to the unknown resistance. A voltage, representing a ratio ($\frac{E_x}{E_{FS}}$) of the voltage drop across the unknown resistor (E_x) to the voltage drop across a "full-scale" resistor (E_{FS}) is measured as a dc ratio and displayed in ohms.

1.10 The analog output of the Isolator is converted to its digital equivalent by the Integrator using the dual-slope technique. Figure 1.3 shows a simplified Integrator circuit and the dual slope produced.

1.11 I_S and I_R, shown as current generators, represent current derived from the signal (I_S) and the reference current generated within the instrument (I_R). Both constant currents, they are applied to integrator capacitor C_i as the appropriate switch is closed.

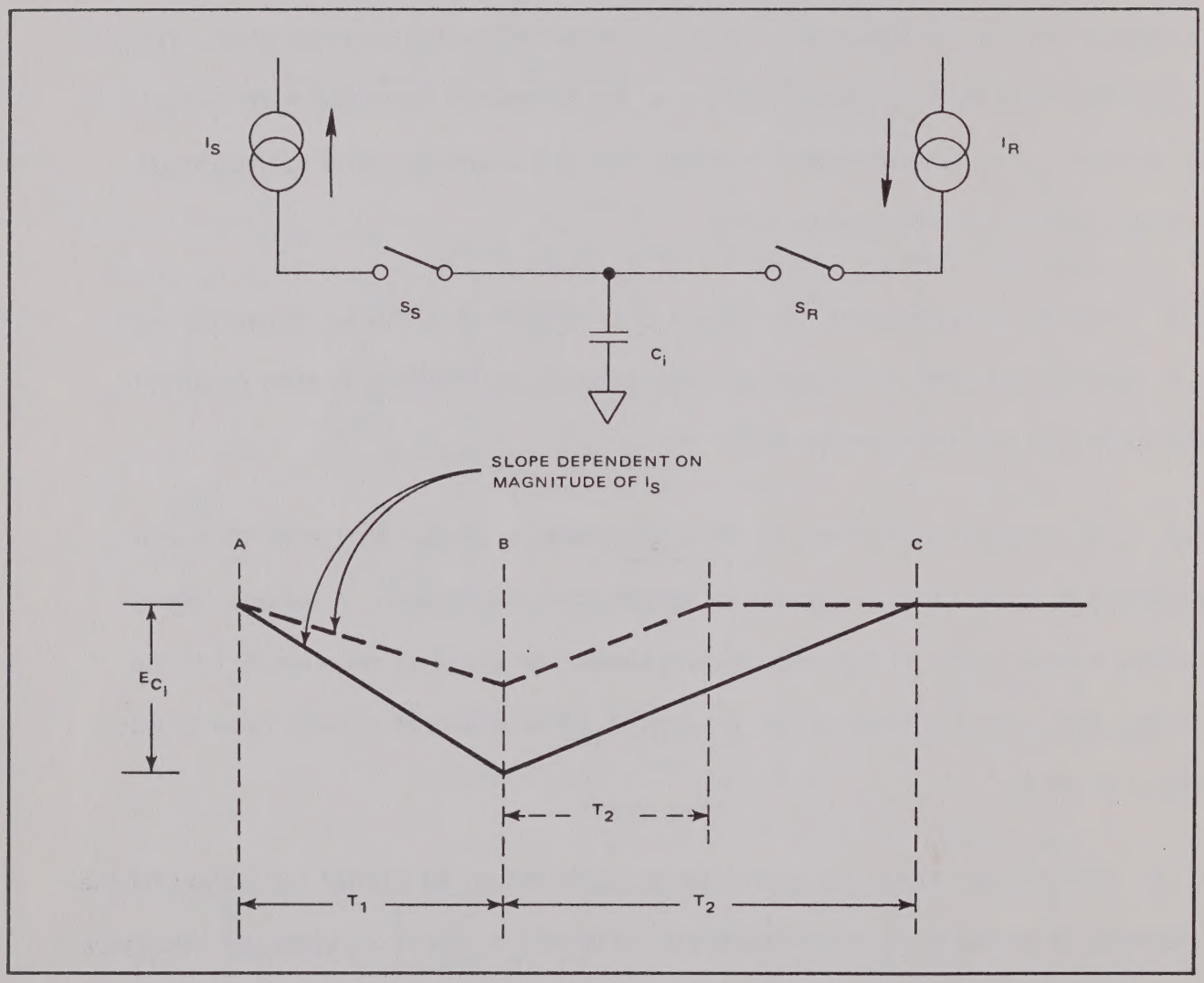


Figure 1.3 - Simplified Integrator Circuit

1.12 Period T1 is the signal integration period. At time A, S_S closes and C_i (initially charged) begins to discharge. T1 is a fixed period. At time B, S_S opens and S_R closes starting the reference integration period (T2). C_i charges at a constant rate. The time required to charge the capacitor to zero is proportional to the voltage across the capacitor at the end of the signal integration period; therefore, it is proportional to the input.

1.13 A counter operates during the integration period at a rate of 600 KHz. The counter output is stored in Storage IC's. The counter is stopped when the reference integration ramp reaches zero by a pulse from the Null Detector. The contents of the Storage circuits are then displayed and routed to the BCD output circuitry.

1.14 The Control Logic (figure 1.2) generates control signals that operate the Integrator switches at the appropriate time.

Table 1.1 - Model 4800 Specifications

GENERAL

Ranging:	Automatic or Manual
Outputs False True	 0V to .5V 2.4V to +5V
Integration Time:	16-2/3 ms
Maximum Common Mode Voltage:	500V guard to case with logic common connected to case; 250V Analog common to guard
Maximum Power Requirement:	115V ± 10%, 50 - 400 Hz, 40 watts 220/240V optional
Operating Temperature:	0° to 50°C
Warmup:	30 minutes to full accuracy
Dimensions:	17 x 3-1/2 x 14 inches
Weight:	16 pounds
Guarantee:	12 months, faulty workmanship or component failure

DC

Full Scale Ranges:	100 mV, 1V, 10V, 100V, 1000V
Resolution:	.01% of range; 10 μV on .1V range

Table 1.1 - Model 4800 Specifications (Continued)

DC (Continued)

Accuracy:	
24 Hours	23°C ± 1°C: ± .005% reading ± .005% f.s.
90 days	23°C ± 5°C: ± .01% reading ± .01% f.s.
Polarity:	Automatic bi-polar
Input Impedance:	Filter Out
.1V range:	>10,000 MΩ
1V range:	>10,000 MΩ
10V range:	>10,000 MΩ
100V range:	10 MΩ
1000V range:	10 MΩ
	Filter In
.1V, 1V, and 10V range:	>10,000 MΩ Shunted by 100 KΩ in series with .3 µF
100V and 1000V range:	10 MΩ ± 1%
Normal Mode Noise Rejection:	Filter Out: 48 dB at every multiple of 60 Hz Filter In: 48 dB at 59 Hz 100 dB at 300 Hz and above
Common Mode Noise Rejection:	
Filter Out, 100Ω unbalance:	140 dB at DC 120 dB, 61 Hz and below plus 48 dB at every multiple of 60 Hz
Filter In, 100Ω unbalance:	140 dB at DC 126 dB, 61 Hz to 100 KHz
Response Time:	Settles to .01% in 5 msec with 10K source
Maximum Voltage Rating (any range):	1000 Volts DC or peak AC

Table 1.1 - Model 4800 Specifications (Continued)

DC/MV

Full Scale Ranges:	10 mV, .1V, 1V, 10V, 100V, 1000V
Resolution:	.01% range; 1 μV on 100 mV range
Accuracy:	
24 Hours, 23°C ± 1°C (after zeroing)	10 mV range: ± .005% reading ± .02% f.s. .1V, 1V, 10V, 100V and 1000V range: ± .005% reading ± .005% f.s.
90 days, 23°C ± 5°C (after zeroing)	10 mV range: ± .01% reading ± .05% f.s. .1V, 1V, 10V, 100V, and 1000V range: ± .01% reading ± .01% f.s.
Polarity:	Automatic Bi-polar
Input Impedance	
Filter Out:	10,000 MΩ all ranges
Filter In:	
10 mV, .1V range:	>10,000 MΩ
1V, 10V range:	>10,000 MΩ shunted by 100KΩ in series with .3 μF
100V, 1000V range:	10 MΩ ± 1%
Normal Mode Noise Rejection:	Same as DC
Common Mode Noise Rejection:	Same as DC
Response Time:	Same as DC
Maximum Voltage:	
10 mV, .1V range:	150V DC or RMS
1V, 10V, 100V, 1000V range:	1000V DC or peak AC

Table 1.1 - Model 4800 Specifications (Continued)

RATIO

Full Scale Ranges:	Same as selected function
Polarity:	Automatic Bi-polar
Reference Voltage Polarity:	Positive only
Reference Voltage Range:	DC, AC, DC/MV: + 1V to 10.5V Ohms: +9V to 10.5V
Maximum Function Voltage:	Same as Function
Reference Input Impedance:	100 Megohms
Reference Normal Mode Rejection:	15 dB at 60 Hz increasing a 6 dB/octave to 100 dB at 1 MHz
Reference Input Bias Current:	250 na
Reference Settling Time: (to .01%)	.25 sec
Accuracy:	
24 Hours, 23°C ± 1°C	DC and MV/DC all ranges but 10 mV: (± .005% reading ± .005% f.s.) x $(\frac{10V}{Ref})$ 10 mV range: (± .005% reading ± .01% f.s.) x $(\frac{10}{Ref})$ Ohms: 1 Ω range: (± .005% reading ± .02% f.s.) x $(\frac{10V}{Ref})$ 10 Ω to 10 MΩ range: (± .005% reading ± .005% f.s.) x $(\frac{10V}{Ref})$ 10 MΩ range: (± .01% reading ± .01% f.s.) x $(\frac{10V}{Ref})$

Table 1.1 - Model 4800 Specifications (Continued)

KILOHMS

Full Scale Ranges:	1Ω , 10Ω , .1 KΩ , 1 KΩ , 10 KΩ , 100 KΩ , 1000 KΩ , 10 MΩ , 100 MΩ
Type:	4 wire
Accuracy:	
24 Hours, 23°C ± 1°C	1Ω range: ± .005% reading ± .02% f.s.
	10Ω to 10 MΩ range: ± .005% reading ± .005% f.s.
	100 MΩ range: ± .01% reading ± .01% f.s.
90 days, 23°C ± 5°C	1Ω range: ± .01% reading ± .05% f.s.
	10Ω to 1 MΩ range: ± .01% reading ± .01% f.s.
	10 MΩ range: ± .05% reading ± .01% f.s.
	100 MΩ range: ± .2% reading ± .01% f.s.
Response Time:	1Ω to 10 MΩ 20 msec
	100 MΩ : 200 msec
Current Through Unknown:	
1Ω , 10Ω range	10.1 ma
100Ω range	1.01 ma
1 kilohm range	.101 ma
10 kilohm range	1 ma
100 kilohm range	.1 ma
1 megohm range	.01 ma
10 MΩ range	1 μa
100 MΩ range	.1 μa
Fault Voltage:	30V peak AC or DC on any range

Table 1.1 - Model 4800 Specifications (Continued)

AC

Full Scale Ranges:	.1V, 1V, 10V, 100V, 1000V
Type:	Distortion Insensitive (DIAC) Converter
Resolution:	.01% of range
Maximum Input Voltage:	750V RMS to 20 KHz, decreasing linearly to 20V at 1 MHz; Frequency X E_{in} < 2×10^7 volt-Hz
Settling Time: (to .1% of final value)	350 msec
Input Impedance Front Input terminals (+IN to -IN Terminal):	1 megohm (±.1%) in series with .22 µF capacitor, shunted by less than 100 pF to common
Common Mode Rejection: DC to 60 Hz (100 Ω Source)	
.1V range	120 dB
1V range	120 dB
10V range	100 dB
100V range	80 dB
1000V range	60 dB
	(CMR is referred to Input full scale)
Temperature Coefficient: (Sine wave input)	
30 Hz to 100 KHz	
.1V range	± .004% rdg ± .010% f.s./°C
1V, 10V, 100V, 1000V range	± .003% rdg ± .002% f.s./°C
100 KHz to 1 MHz	
.1V, 1V, 10V, 100V, 1000V range	± .01% rdg ± .01% f.s./°C

Table 1.1 - Model 4800 Specifications (Continued)

AC (Continued)

Accuracy:	
24 Hours, 23°C ± 1°C .002V < E_{IN} < 500V Sine Wave Input (after offset adjust)	
30 Hz to 50 Hz	.1V range: ± .10% reading ± .08% f.s. 1V, 10V, 100V, 1000V range: ± .10% reading ± .01% f.s.
50 Hz to 20 KHz	.1V range: ± .02% reading ± .08% f.s. 1V, 10V, 100V, 1000V range: ± .02% reading ± .01% f.s.
20 KHz to 100 KHz	.1V range: ± .03% reading ± .10% f.s. 1V, 10V, 100V, 1000V range: ± .03% reading ± .02% f.s.
300 KHz to 1 MHz	.1V range: ± .5% reading ± .5% f.s. 1V, 10V, 100V, 1000V range: ± .5% reading ± .1% f.s.
90 days, 23°C ± 5°C	.1V range: Add ± .03% reading ± .03% f.s. to 24 Hour specification 9.10 1V, 10V, 100V 1000V range: Add ± .01% reading ± .01% f.s. to 24 Hour specification 9.10
6 months, 23°C ± 5°C	.1V range: Add ± .04% reading ± .03% f.s. to 24 Hour specification 9.10

Table 1.1 - Model 4800 Specifications (Continued)

AC (Continued)

	1V, 10V, 100V, 1000V range: Add ± .02% reading ± .01% f.s. to 24 Hour specification 9.10
Shunt Capacitance: Rear Input Option (+IN to -IN Terminal)	120 pF

SECTION 2

INSTALLATION & OPERATION

2.1 UNPACKING AND INSPECTION.

2.2 The Model 4800 DVM is secured in four molded, plastic-foam forms and packaged in a double-walled cardboard carton for shipment. The plastic forms hold the DVM securely in the carton and absorb any reasonable external shock normally encountered in transit. Prior to unpacking, examine the exterior of the shipping carton for any signs of damage. Carefully remove the DVM from the carton and inspect the exterior of the instrument for any signs of damage. If damage is found, notify the carrier immediately.

2.3 POWER CONNECTIONS.

2.4 A standard, eight-foot, three-wire power cable is supplied with the instrument. It connects to the POWER connector on the rear panel.

2.5 A .5 amp line fuse is mounted on the rear panel of the instrument.

2.6 Instruments for export, designated as 4800E, are equipped with a special transformer and jumper matrix, allowing the user to adapt the instrument for operation on various line voltages. In figure 2.1 is shown the proper jumper placement on the power matrix board for each line voltage. The matrix board assembly is mounted directly to the power transformer.

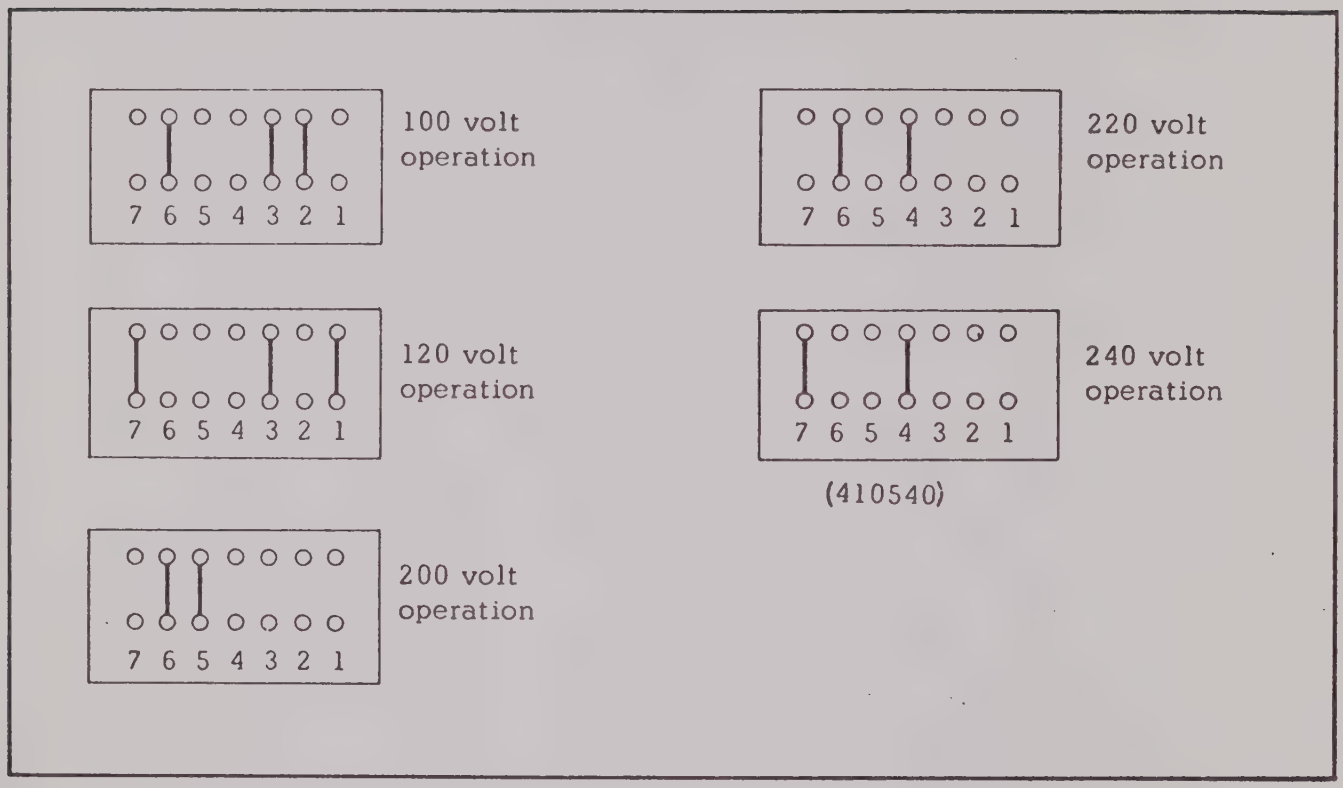

100 volt operation
7 6 5 4 3 2 1
220 volt operation
7 6 5 4 3 2 1
120 volt operation
7 6 5 4 3 2 1
240 volt operation
7 6 5 4 3 2 1
(410540)
200 volt operation
7 6 5 4 3 2 1

Figure 2.1 - Power Transformer Taps

2.7 CONTROLS.

2.8 The POWER switch, on the front panel, applies power to the instrument when ON. The OFF position removes power from all portions of the instrument. Other controls are described in table 2.1.

Table 2.1 - Front Panel Switches

Switch	Position	Function
Function Select (rotary switch)	AC	Selects the measurement of AC voltages on the .1, 1, 10, 100, and 1000 volt ranges (max. input, 700V RMS)
	DC	Selects the measurement of DC voltages on the .1, 1, 10, 100, and 1000 volt ranges (max. input, 1000V)
	mV - DC	Selects the measurement of DC voltages on the 10 mV range plus the five d-c ranges (above)
	Ω - MΩ	Selects the measurement of resistance on the 1 and 10 ohm ranges; on the .1, 1, 10, 100, and 1000 Kilohms ranges; or on the 10 or 100 Megohm ranges
Range Select (rotary switch)	AUTO	Selects Auto Range in which the optimum range is selected automatically by internal circuits. Uprange occurs at 200% of full scale; Downrange occurs at 10% of full scale
	Other Positions	Enables manual selection of fixed ranges. Ranges permissible for each function are inscribed on the panel
DATA OUTPUT (pushbutton)	Depressed	Enables the print pulse causing BCD data at P202 to be recorded by printer, or other output device. (Output data is present at P202 regardless of the position of this switch.)
PROGRAM CONTROL (pushbutton)	Depressed	Enables the selection of range, function, and mode to be made externally through the remote programming connector
PERIODIC (pushbutton)	Depressed	Selects the Periodic mode of operation in which the instrument automatically takes readings at the rate of 3-1/3 per second (approx.)

Table 2.1 - Front Panel Switches (Continued)

Switch	Position	Function
HOLD (pushbutton)	Depressed	Selects the HOLD mode in which each reading is held until a new reading is commanded by depression of the SINGLE switch or by an external read command
SINGLE (momentary-contact pushbutton)	Depressed	Commands a new reading to be taken in HOLD mode. Only one reading is taken and held until SINGLE is again depressed (NOTE: DVM will not Auto Range in Single Read mode.)
RATIO (pushbutton)	Depressed	Selects a ratio measurement in which the readout represents the ratio of the input to an external reference voltage (applied at terminals on the rear panel) multiplied by 10: $\frac{E_{in}}{E_{Ref}} \times 10$
FILTER (pushbutton)	Depressed	Adds an active three-pole filter across the input circuit when measuring any function but AC. In AC mode, filter is switched in automatically
FRONT/REAR (slide switch on Model 4800-1 only)	Front	Selects signal at front set of input terminals for measurement
	Rear	Selects signal at rear set of input terminals for measurement

2.9 INPUT CONNECTIONS.

2.10 Signal input binding posts are located on the front panel of the instrument. Connections to these terminals are made with standard "banana" plugs on the input cable. Instruments designated as 4800-1 are equipped with a duplicate set of input terminals on the rear panel. The input may be connected to either set of terminals. Pin assignment of the rear input connector is shown in table 2.2.

Table 2.2 - Pin Assignment, Rear Input Connector*

Pin	Function
2	Guard
3	- Input
4	- Current
6	+ Current
7	+ Input
Connector: Viking TKR7-101 (Dana 600673) Mating Connector: Viking TKP7-100 (Dana 600616)	

2.11 EXT REF terminals (binding posts) on the rear panel are the inputs for an external reference voltage used in ratio measurements.

2.12 ANALOG OUTPUT terminals (binding posts) on the rear panel deliver a scaled and buffered 0 to ± 20V dc (including overrange) voltage equivalent of the readout. This output can be used to drive a recorder or as an accurate (.02%) voltage source. Output current is 1 ma, maximum.

2.13 OPERATING INSTRUCTIONS.

2.14 For basic DC, mV, or AC measurement, a single-conductor shielded cable is used for interconnection between the signal source and the DVM. The conductor carries the high side of the signal and connects to the + INPUT terminal. The shield connects to the - INPUT terminal which is strapped to GUARD. (See figure 2.2.)

*NOTE: To remove the mating connector from the rear input, grasp the connector with a finger on each of the two knurled areas of the connector (top and bottom). Squeeze firmly to release lock and pull.

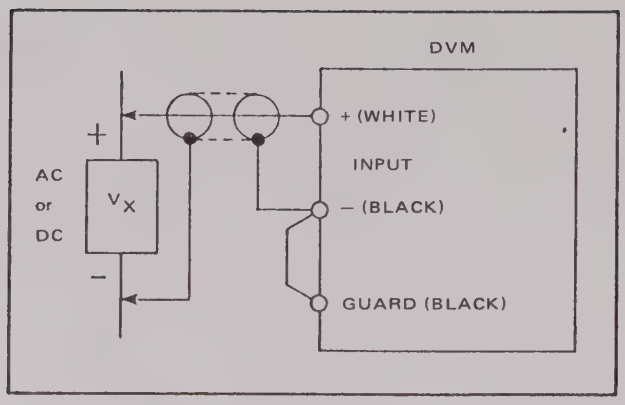


Figure 2.2 - Basic Measurement Connection

2.15 Where common-mode signals are present, a two-conductor shielded cable is required. Connections are made as shown in figure 2.3. The signal input terminals are isolated from the digital section and from power ground.

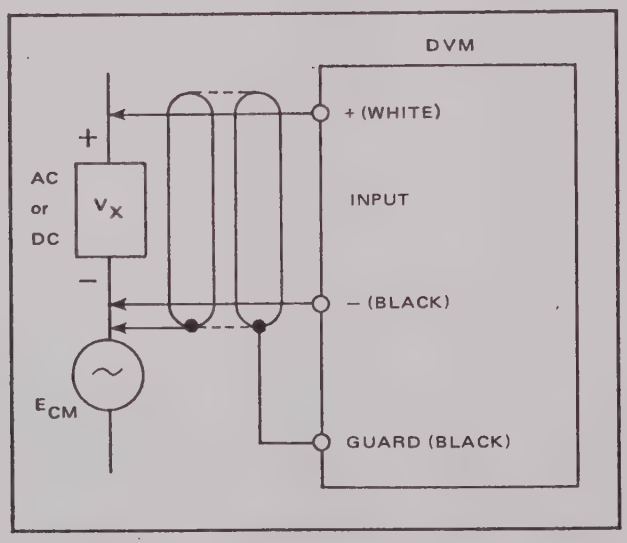


Figure 2.3 - Connections Where CM Present

2.16 For Resistance measurement, connect leads to the unknown resistance as shown in figure 2.4.

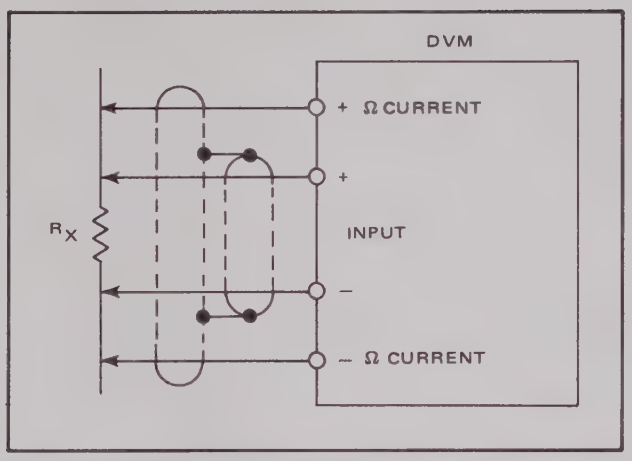


Figure 2.4 - Connections for Resistance Measurement

2.17 Ratio measurements are made by applying a positive d-c voltage to the reference input terminals on the rear panel and an input signal of any function at the front input terminals. For DC/DC, DC-MV/DC, or AC/DC ratios, the reference voltage must be within the range of +.5V to +10.5V. For Ω/DC ratio, the reference voltage must be within +9V to +10.5V. Input voltage limitations (numerator) are the same as those given for conventional measurement of the particular function. The readout is the ratio multiplied by ten: $E_{input}/E_{reference} \times 10$.

2.18 The - INPUT terminal is internally connected to the - REF input terminal.

2.19 Once the instrument has been connected to the power line and to the signal source in accordance with the instructions, the operator can make all required measurements by setting controls as described in table 2.1.

CAUTION

Do not exceed the following maximum inputs:

DC	1000 VDC or peak AC
DC/mV	On 10 mV and .1 volt range: 150 VDC or RMS AC
	On 1V, 10V, 100V, and 1000V ranges: 1000 VDC or peak AC
AC	750V RMS to 20 KHz decreasing to 200V RMS at 100 KHz
RATIO	input: same as function selected reference: +10.5V
OHMS	With + OHMS CURRENT terminal connected to + INPUT:
	1Ω to 10KΩ ranges: -30V/+150V DC or peak AC
	100KΩ to 100MΩ ranges: ± 150V DC or RMS AC
	with + OHMS CURRENT terminal floating (from input):
	± 150V DC or RMS AC

2.20 The DVM has 100% overrange capability in all functions except the 1000 range on AC and DC. Maximum AC input is 750V RMS; maximum DC input is 1000 volts. On any range, an overrange condition is indicated by the maximum readout of 20000 and illumination of the NO indicator on the readout. The NO indicator also lights if a function or range is selected for which the DVM is not equipped.

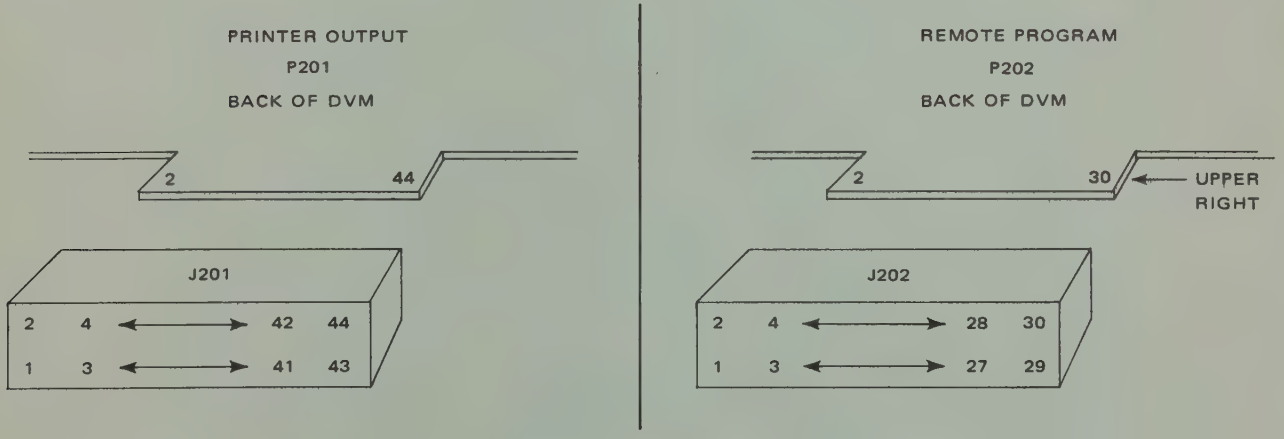
SPECIAL NOTE

PRINTER OUTPUT AND REMOTE PROGRAM CONNECTORS.

On some instruments, the output and program connectors are not keyed; it is possible to connect them improperly. For proper orientation of the connectors, install mating connectors as described below.

Printer Output (J201). Mating connector must be installed so that pin 44 mates with the upper right-hand pin of P201 (when viewing the DVM from the rear).

Remote Program (J202). Mating connector must be installed so that pin 30 mates with the upper right-hand pin of P202 (when viewing the DVM from the rear).



2.21 BCD OUTPUT.

2.22 Output data is delivered to the Printer Output Connector P201 in 8-4-2-1 BCD code at standard TTL logic levels:

False = 0V to +.5V

True = +2.4V to +5V

Maximum "fanout" = 2

Maximum Capacitive Load = 500 pF

2.23 All outputs are referenced to data output ground (pin 22). This ground may be floated at up to 200V (peak) from power ground. Table 2.3 lists the pin assignments of P201. The connector is double-edged.

CAUTION

True output lines are not short-circuit proof. Accidental grounding may damage the output circuitry.

2.24 DATA OUTPUT.

2.25 Data output is delivered on 18 lines in positive true format. Table 2.3 identifies each output by decade and BCD weight (pins 29 - 44). Polarity is indicated on pins 28 (-) and 26 (+) in positive true levels. Pin 27, $10K_1$, is true to indicate a "1" in the most-significant digit (10K); pin 25, $10K_2$, is true to indicate a "2".

2.26 FUNCTION OUTPUT.

2.27 Function outputs appear in negative true format on six pins: $\overline{\text{DC/MV}}$ (pin 19), $\overline{\text{Ratio}}$ (pin 17), $\overline{\text{Filter}}$ (pin 15), $\overline{\text{DC}}$ (pin 13), $\overline{\text{Ohms}}$ (pin 11), and $\overline{\text{AC}}$ (pin 9).

Table 2.3 - Printer Output Connector

	PIN		
10_1	44	43	$1K_1$
10_8	42	41	$1K_8$
10_2	40	39	$1K_2$
10_4	38	37	$1K_4$
1_1	36	35	100_1
1_8	34	33	100_8
1_2	32	31	100_2
1_4	30	29	100_4
- Polarity	28	27	$10K_1$
+ Polarity	26	25	$10K_2$
$\overline{\text{DVM Command}}$	24	23	PRINT
Ground	22	21	NO
$\overline{\text{Hold}}$	20	19	$\overline{\text{DC/MV}}$
+5V	18	17	$\overline{\text{Ratio}}$
B_0	16	15	$\overline{\text{Filter}}$
A_0	14	13	$\overline{\text{DC}}$
C_0	12	11	$\overline{\Omega}$
D_0	10	9	$\overline{\text{AC}}$
	8	7	
	6	5	
	4	3	
	2	1	
Connector Type: Cinch 50-44C-10			

2.28 RANGE OUTPUT.

2.29 Range identification is given in four-line BCD code in positive true format according to table 2.4.

Table 2.4 - Range Codes

Range	A (pin 14)	B (pin 16)	C (pin 12)	D (pin 10)	BCD
1 Ω	1	0	0	0	1
10 Ω , 10 mV	0	1	0	0	2
.1 KΩ , .1V	1	1	0	0	3
1 KΩ , 1V	0	0	1	0	4
10 KΩ , 10V	1	0	1	0	5
100 KΩ , 100V	0	1	1	0	6
1000 KΩ , 1000V	1	1	1	0	7
10 MΩ	0	0	0	1	8
100 MΩ	1	0	0	1	9

2.30 DVM COMMAND.

2.31 In the absence of the Programming option, DVM Command (pin 24) is used to command a reading. The command is automatically delayed 5 msec ± 20% to allow for input settling time and digitizer reset. The command occurs on the positive TTL transition. Specifications for command pulse are shown in figure 2.5.

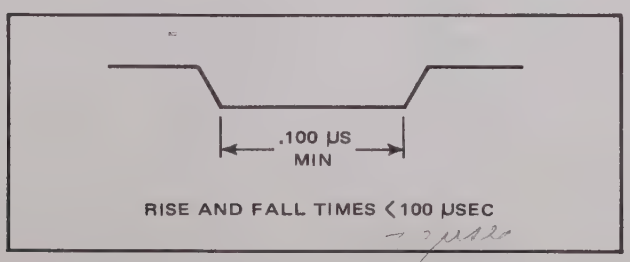


Figure 2.5 - DVM Command Pulse

2.32 PRINT PULSE.

2.33 The Print pulse (pin 23) remains true during the signal and reference integration periods plus the overrange period, if any. It drops to false to indicate to the printer that the reading is complete and can be printed.

2.34 "NO" Indication.

2.35 The "NO" line (pin 21) duplicates the "NO" indicator on the readout. An overrange condition is indicated by a true "NO" line and data output of 20000. The line is also true if a function or range is selected for which the instrument is not equipped.

2.36 REMOTE PROGRAMMING.

2.37 The DVM receives commands through program input connector J202 on the rear panel. Pin assignments of P202 are listed in table 2.5. Commands are made by a switch closure from the selected command to ground (pin 25) or by standard TTL logic levels (0 to .4V, false; +2.4 to +5.0V, true) with respect to ground.

2.38 Function Programming. Function is selected by applying a ground or false logic level to the appropriate pin:

DC	pin 14
DC/MV	pin 19
AC	pin 26
OHMS	pin 24
RATIO	pin 22
FILTER	pin 20

NOTE: When programming $\overline{\text{AC}}$ function and AUTORANGE, FILTER-pin 20, must also be selected to obtain proper timeout. This is not necessary when a fixed range is programmed.

2.39 Range Programming. The range, except for Autorange, is programmed by applying a positive true BCD code to the four range lines (pins 12, 15, 17, and 18) according to the following table. Autorange is selected by a ground or false logic level applied to pin 16.

Range	Range A pin 12	Range B pin 18	Range C pin 15	Range D pin 17
1 ohm	1	0	0	0
10 ohms, 10 mV	0	1	0	0
.1 Kilohm, .1V	1	1	0	0
1 Kilohm, 1V	0	0	1	0
10 Kilohm, 10V	1	0	1	0
100 Kilohms, 100V	0	1	1	0
1 Megohm, 1000V	1	1	1	0
10 Megohms	0	0	0	1
100 Megohms	1	0	0	1

Table 2.5 - Program Input Connector P202

	PIN		
Remote (Output Flag)	30	29	$\overline{\text{Ext DVM Command (FAST)}}$
$\overline{\text{Ext Hold}}$	28	27	$\overline{\text{Ext DVM Command (Timeout)}}$
$\overline{\text{Ext AC}}$	26	25	Ground
$\overline{\text{Ext } \Omega}$	24	23	+5 Volt
$\overline{\text{Ext Ratio}}$	22	21	$\overline{\text{Ext Program Control}}$
$\overline{\text{Ext Filter}}$	20	19	$\overline{\text{Ext DC/MV}}$
Ext B in	18	17	Ext D in
Ext $\overline{\text{AUTO}}$	16	15	Ext C in
Ext $\overline{\text{DC}}$	14	13	
Ext A in	12	11	

(Continued)

Table 2.5 - Program Input Connector P202 (Continued)

	PIN		
Not Used	10	9	Not Used
Not Used	8	7	Not Used
Not Used	6	5	Not Used
Not Used	4	3	Not Used
Not Used	2	1	Not Used
Connector Type: Cinch 50-30C-10			

2.40 $\overline{\text{Ext Program Control}}$. A contact closure to ground or a false logic level to pin 21, $\overline{\text{Ext Program Control}}$, disables all front panel controls. Operation of the DVM is then under control of the remote program input.

2.41 Remote (Output Flag). Remote (Output Flag), pin 30, is an output line that remains at true logic level while the DVM is under remote control.

2.42 +5 Volts. A voltage of 5 volts ± 5% from the logic power supply is available for systems use. Current output is .1 amp, maximum.

2.43 Read Commands. Either of two read command lines can be selected by a contact closure to ground or by a negative logic level transition. Pin 29, Fast Command, starts a new measurement after a 5 msecond reset delay. Pin 27, Timeout Command, starts a new measurement after a Timeout delay to allow for settling time of the measured signal (in addition to the 5 msec basic delay). Timeouts for the various functions are listed in the following table. In Autorange, the indicated delays are taken following each range change.

Function	Timeout
DC	30 msec
1 ohm to 10 Megohm	300 msec
100 Megohm	300 msec
Filter	250 msec (plus function timeout)
AC*	500 msec

*See note on page 2-12.

SECTION 3

CALIBRATION

3.1 Isolator Voltage Zero (Figure 3.1).

a. Set RANGE to .1; FUNCTION to DC; FILTER out.

b. Short point (1) to ground (front panel - INPUT terminal).

c. Connect microvoltmeter across point (1) and point (2).

d. Adjust R36 for a voltage of less than 10μ volts on the microvoltmeter. Remove microvoltmeter.

3.2 Isolator Current Zero.

a. Connect microvoltmeter across ANALOG OUTPUT terminals on rear panel (Isolator output).

b. Adjust front panel OFFSET (DC) for 0 ± 100μ volts reading on microvoltmeter.

c. Remove short from point (1) to ground; place FILTER in.

d. Insert 1 Megohm resistor across input terminals.

e. Adjust R12 for output voltage on microvoltmeter of less than ± 100μ volts.

3.3 DC Gain Adjustment (Digitizer PCB)

a. Set RANGE to AUTO; FUNCTION to DC; depress RATIO.

b. Apply inputs to DVM and make indicated adjustments on Digitizer board as listed in the following table.

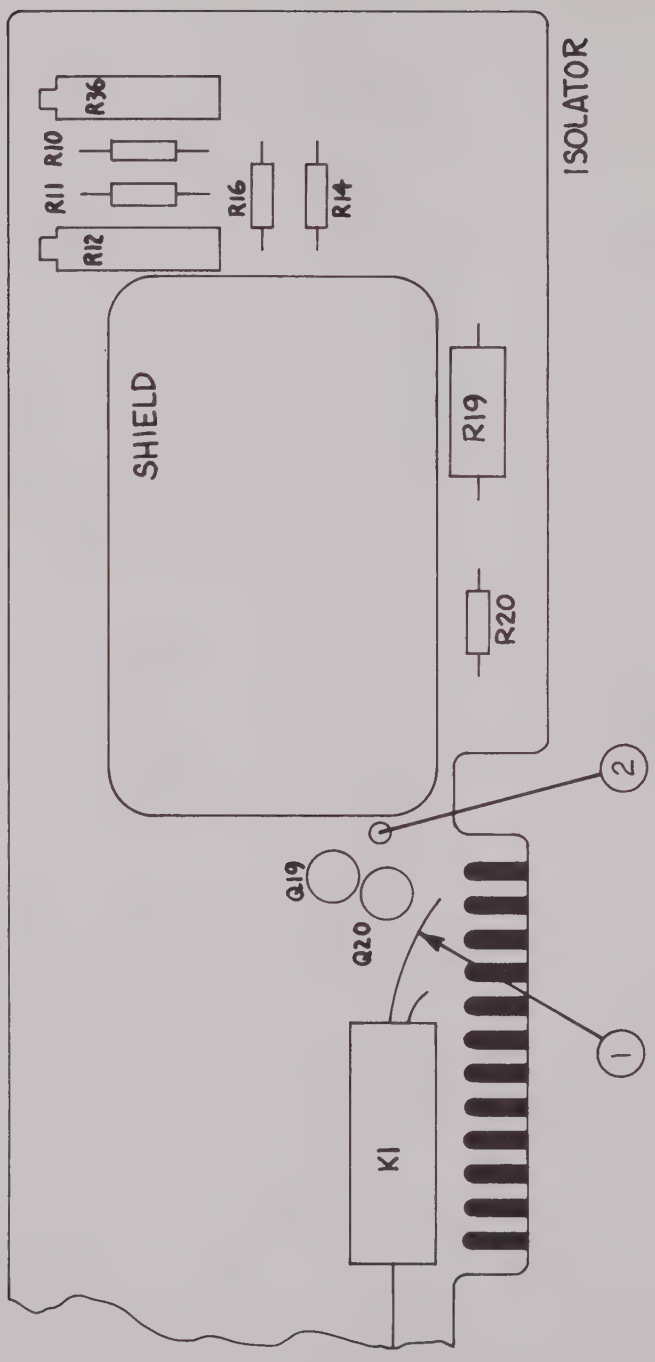


Figure 3.1 - Isolator Adjustment Location

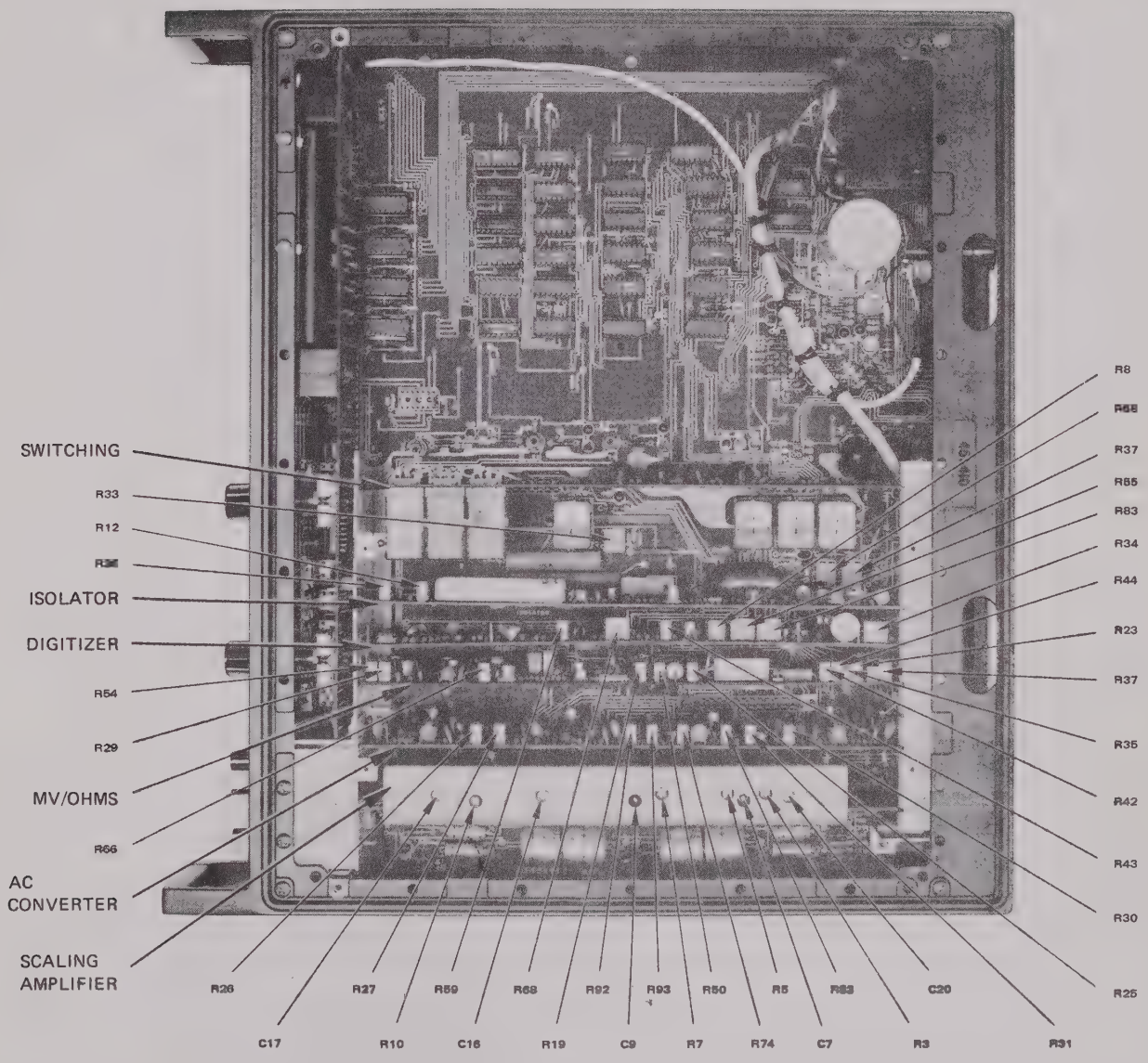


Figure 3.2 - Adjustment Locations

b. Apply inputs to DVM and make indicated adjustments on Digitizer board as listed in the following table.

SIGNAL INPUT	REF. INPUT	MODE	ADJUST: (Figure 3.2)	For Readout of:
-1.90000V	+1.00000	DC/DC	R55	-19.000V
+1.90000V	+1.00000	DC/DC	R68	+19.000V
-19.0000V	+10.0000	DC/DC	verify readout of -19.000V ± 1 digit	
-19.0000V	-	DC*	R43	-19.000V ± 1 digit
+19.0000V	-	DC	R59	+19.000V ± 1 digit

*Switch from RATIO to DC measurement

3.5 Range Calibration. (Main Interconnection PCB)

a. Set FUNCTION to DC; RANGE to AUTO.

b. Apply inputs to DVM and perform the indicated adjustment as listed in following table.

INPUT	ADJUST:	For Readout of:
± .190005	R68 (.1/1KV)	± .19001V
± 1.90005	R37 (1V)	± 1.9001V
± 190.005	R33 (100V)	± 190.01V
± 1000.00	verify readout	± 1000.0V ± .5 digit

3.6 OHMS-MV ACCESSORY.

3.7 Voltage Zero.

a. Short the + and - front input terminals with a copper clip lead.

b. Select DC/MV FUNCTION; 10 MV RANGE; FILTER in.

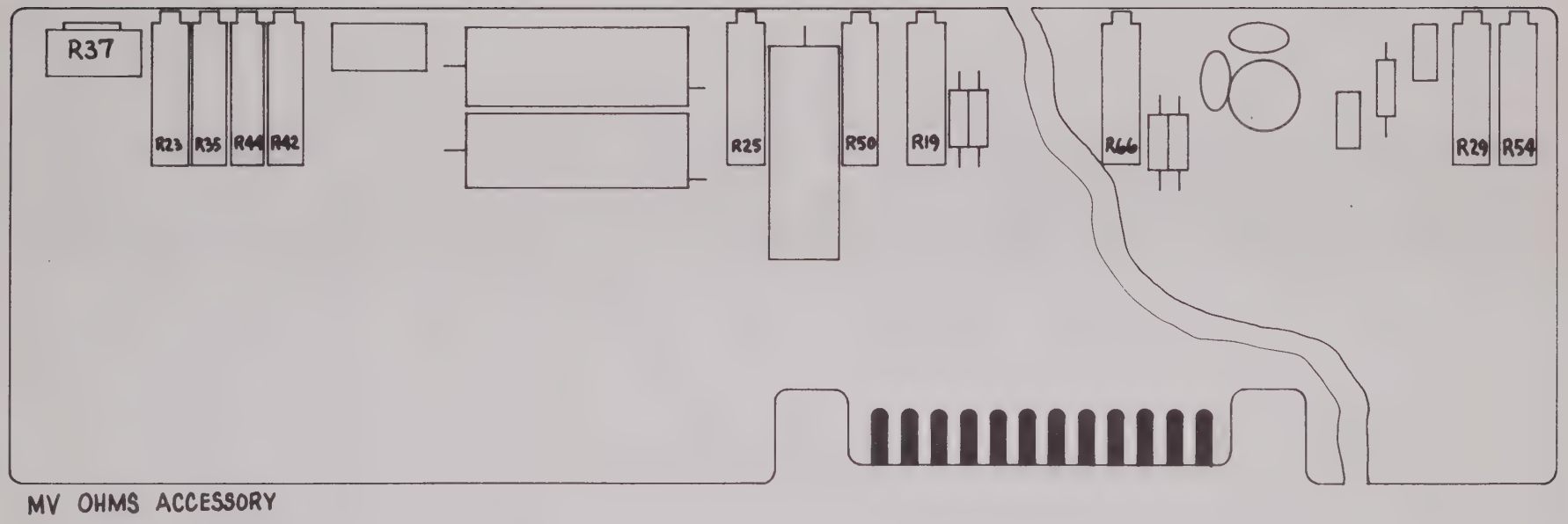


Figure 3.3 - MV Ohms Accessory

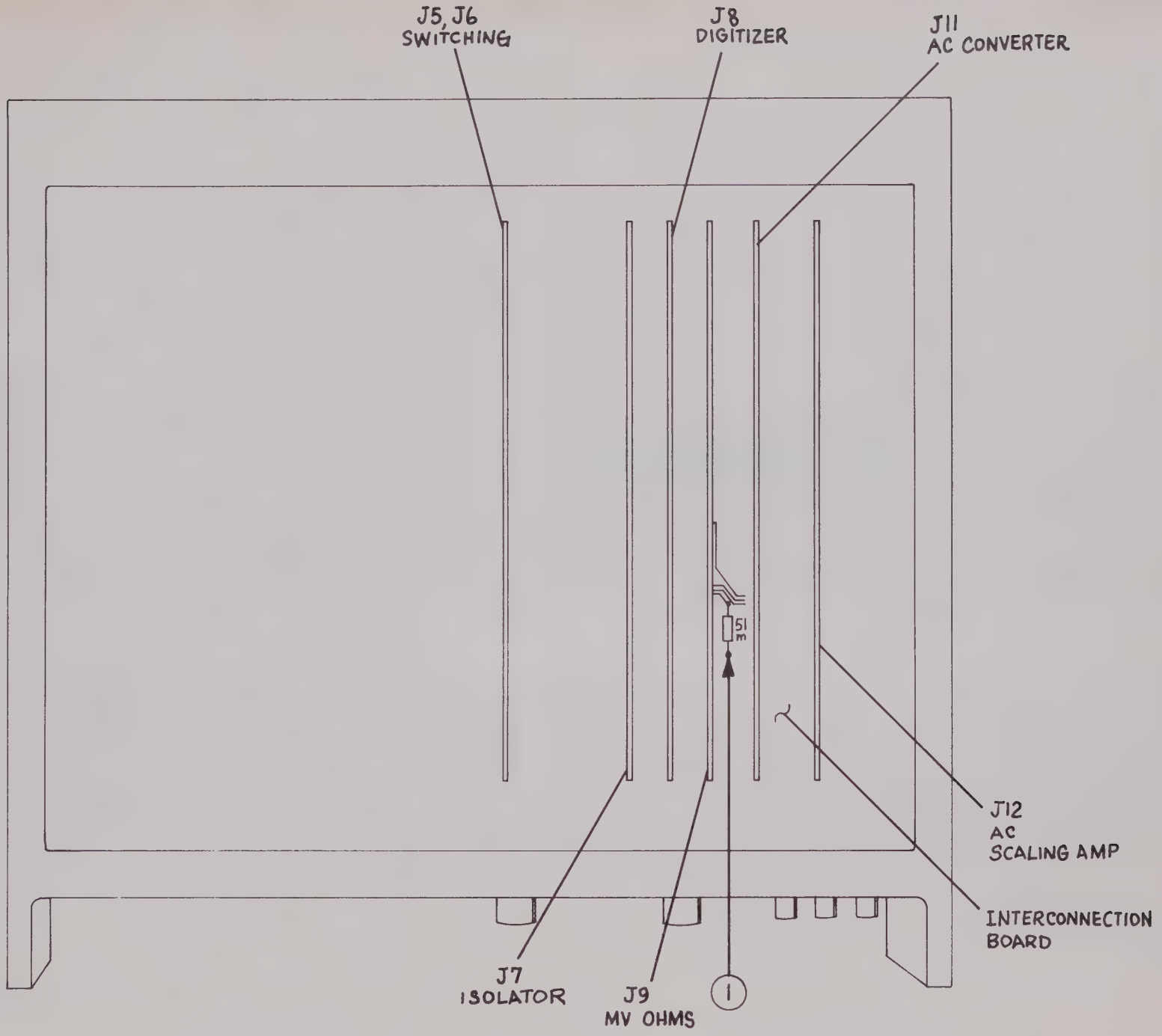


Figure 3.4 - Test Point MV Offset

h. Select 100 Kilohm range. Connect input leads to a 190 Kilohm standard resistor. Adjust R35 for a readout of 190.00 Kilohms ± 1 digit.

i. Select 10 Kilohm range. Connect input leads to a 19 Kilohm standard resistor. Adjust R23 for a readout of 19.000 Kilohms ± 1 digit.

j. Select 1 Kilohm range. Connect input leads to a 1.9 Kilohm standard resistor. Adjust R37 for a readout of 1.9000 Kilohms ± 1 digit.

k. Select 100 Ohm range. Connect input leads to a 190 Ohm standard resistor. Verify that readout is 190.00 Ohms ± 1 digit.

l. Select 10 Ohm range. Connect input leads to a 19 Ohm standard resistor. Remove + OHMS CURRENT lead from resistor. Verify that readout is 00000.

m. Change FUNCTION to DC/MV, RANGE to 10 MV. Verify readout of 00000. If necessary, readjust MV OFFSET on front panel for zero. Replace + OHMS CURRENT lead to resistor. Return FUNCTION to OHMS, RANGE to 10.

n. Adjust R25 for a readout of 19.000 Ohms ± 1 digit.

> NOTE
>
> When calibrating the 10-ohm and 1-ohm ranges; it is important that standard resistors have low-thermal characteristics. Otherwise, faulty calibration will result.

o. Select 1 Ohm range. Connect input leads to a 1.9 Ohm standard resistor. Verify that readout is 1.9000 Ohms ± 1 digit. If not, repeat the MV Offset adjustment (step m).

3.11 AC CALIBRATION (Perform steps in order listed. Refer to figure 3.2 for adjustment locations.)

3.12 AC Zero Adjustments. Place AC Converter on extender board. Remove Scaling Amplifier and replace with bypass board. Select AC, 1V range. The following zero adjustments are made with input terminals open.

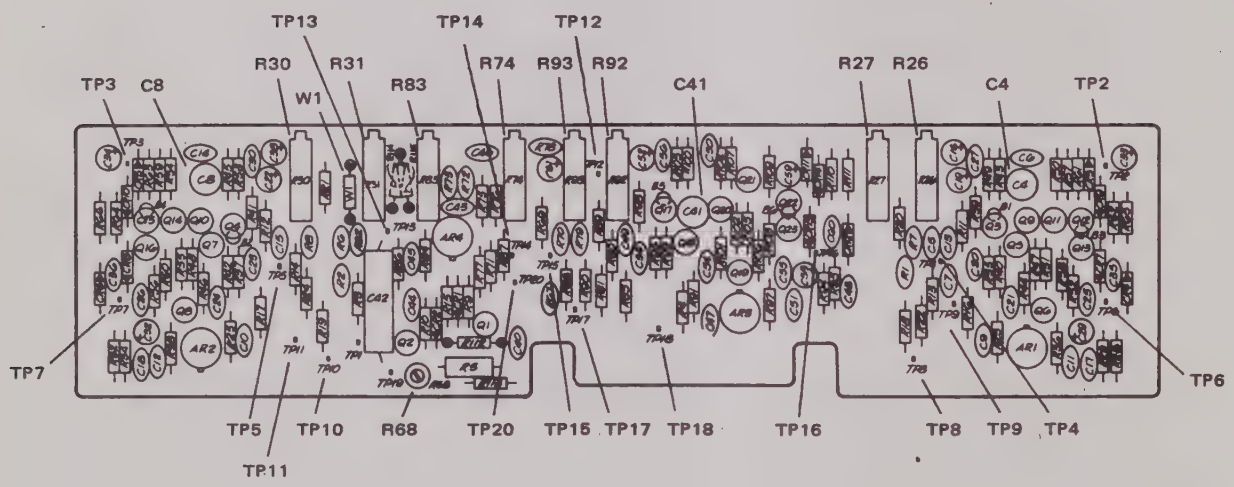


Figure 3.4 - Test Points - AC Converter

a. Bias Current Zero. Connect the microvoltmeter between the test points listed below and ground (TP9, TP11, or TP18). Place a 10 KΩ, 1/4 watt resistor in series with input probe. With the adjustment indicated for each test point, adjust for zero ± 10 μvolts.

Test Point (Figure 3.4)	Adjustment
TP8	R26
TP10	R30
TP17	R92
TP14	R74

b. Voltage Offset Zero. Adjust for zero ± 10 µvolts at the following test points with the indicated adjustment.

Test Point	Adjustment
TP4	R27
TP5	R31
TP15	R93
TP13	R83

c. Output Symmetry Adjustment. Adjust for symmetry at the following pairs of test points (e.g., if TP6 reads +6 µvolts, TP2 will read -6 µvolts when adjusted).

Test Points	Adjust:	Voltage at Balance
TP2, TP6	R27	less than ± 10 µvolts
TP3, TP7	R31	less than ± 30 µvolts
TP12, TP16	R93	less than ± 30 µvolts

3.13 AVT Frequency Response Adjustment. Open jumper W1 on AC Converter (figure 3.4).

a. Apply 1.9000 volts RMS at 1 KHz to DVM input. Record the readout (about 1.5900).

b. Apply 1.9000 volts RMS @ 100 KHz to DVM input. Adjust C4 for same reading recorded at (a).

3.14 100 mV Gain Adjustment. Replace jumper W1. Remove bypass board and replace with Scaling Amplifier. Leave AC Amplifier on extender. Select 100 mV range; apply 100 mV at 1 KHz. Adjust R68 on AC Converter for readout of 100.00 mV.

3.15 100 mV Zero Adjustment. Select 100 mV range. Apply 10.000 mvolts, 1 KHz to input terminals. Adjust AC ZERO for readout of .01000.

3.16 Break Amplifier Frequency Response Adjustment.

a. Apply 1.9000 volts RMS @ 1 KHz to DVM input. Record readout.

b. Apply 1.9000 volts RMS @ 100 KHz. Adjust C8 and C41 for minimum or maximum readout without oscillation or going into "lockup".

c. Readjust C8 and C41 for readout obtained in step (a) with approximately equal contribution from each capacitor.

3.17 Scaling Amplifier Low Frequency Gain Adjustment. Remove AC Amplifier from extender and plug it directly into connector. Apply the inputs listed below and

adjust the indicated control (on Scaling Amplifier) for a readout equal to the input voltage.

RANGE	INPUT		
	VOLTAGE	FREQ	ADJUST
1V	1.9000V	1 KHz	R10 (1V LF)
10V	19.000V	1 KHz	R7 (10V LF)
100V	100.00V	1 KHz	R5 (100V LF)
1 KV	1 KV	1 KHz	R3 (1 KV LF)

Repeat step 3.11d (with Scaling Amplifier installed).

3.18 Scaling Amplifier High Frequency Gain Adjustment. Apply the inputs listed in the following table and adjust the indicated control (on Scaling Amplifier) for a readout equal to the input voltage. When completed, check frequency response to 1 MHz.* Readjust High Frequency (HF) adjustments if necessary. Check .1V range for calibration and frequency response.

RANGE	INPUT		
	VOLTAGE	FREQ	ADJUST
1 KV	500V	40 KHz	C16 (input HF)
1V	1.9V	100 KHz	C17 (1V HF)
10V	19V	100 KHz	C9 (10V HF)
100V	100V	100 KHz	C7 (100V HF)
1 KV	500V	40 KHz	C20 (1 KV HF)

*Maximum Inputs:

1000V to 20 KHz
500V to 40 KHz
100V to 200 KHz
20V to 1 MHz

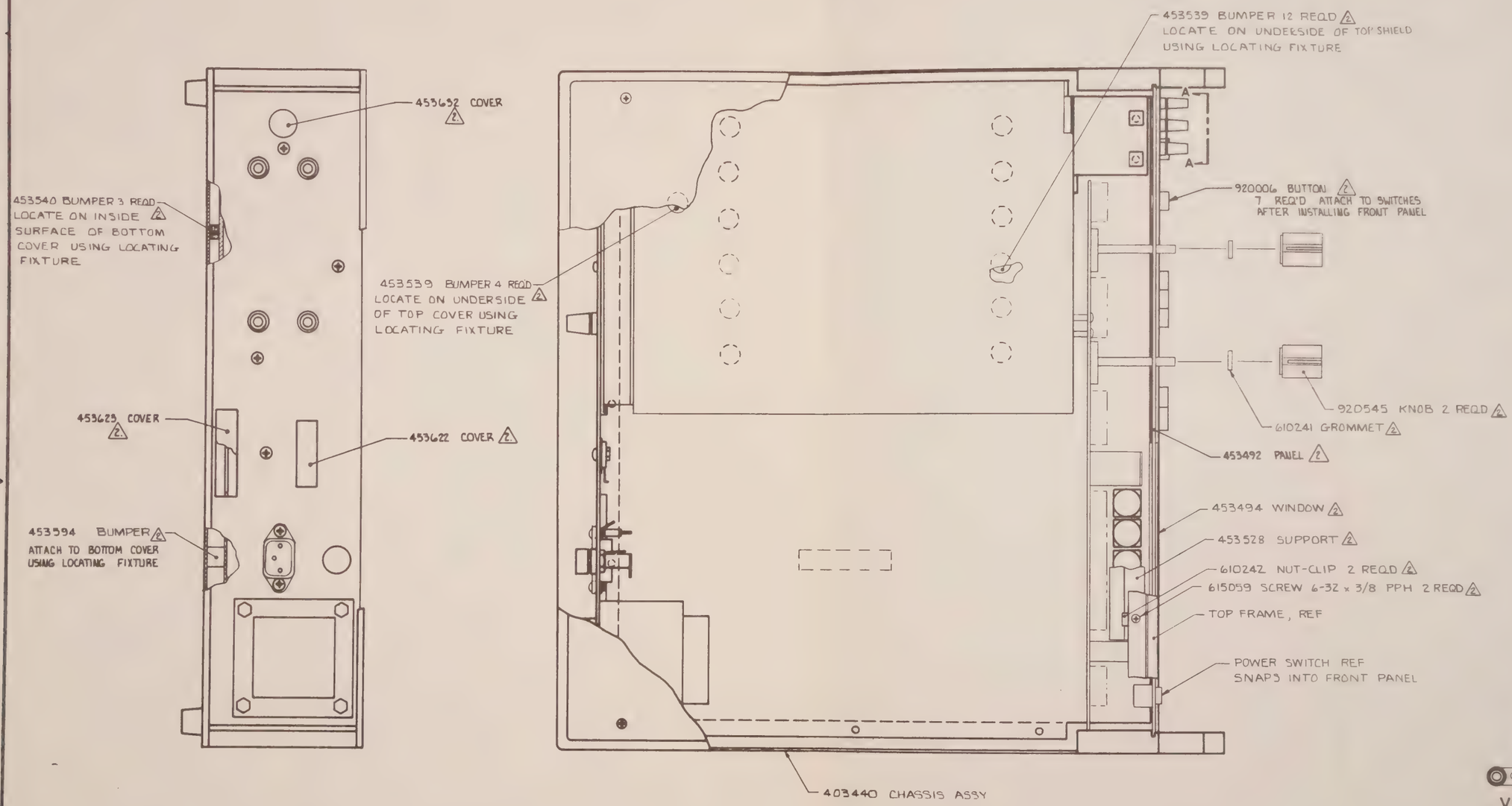
3.19 After replacing AC Converter into closed DVM, recheck the 100 mV zero after instrument has warmed up for several minutes. Readjust R10, if necessary.

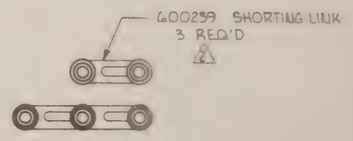
SECTION 4

DRAWINGS

4.1 DRAWINGS.

400961	Model 4800 DVM Assembly
403433	Interconnection PCB Assembly
430958	Interconnection PCB Schematic
403430	Display PCB Assembly
430957	Display PCB Schematic
403432	Digitizer PCB Assembly
430949	Digitizer PCB Schematic
403434	Isolator PCB Assembly
430951	Isolator PCB Schematic
403435	MV-Ohms PCB Assembly
430950	MV-Ohms PCB Schematic
403431	Switching PCB Assembly
430952	Switching Schematic
403502	Rear Input Accessory
403470	AC Converter PCB Assembly
430964	AC Converter PCB Schematic
403472	Scaling Amplifier PCB Assembly
430966	Scaling Amplifier PCB Schematic
403436	Program PCB Assembly
430959	Program PCB Schematic


453632 COVER
453540 BUMPER 3 REQD LOCATE ON INSIDE SURFACE OF BOTTOM COVER USING LOCATING FIXTURE
453539 BUMPER 4 REQD LOCATE ON UNDERSIDE OF TOP COVER USING LOCATING FIXTURE
453629 COVER
453622 COVER
453594 BUMPER ATTACH TO BOTTOM COVER USING LOCATING FIXTURE
453539 BUMPER 12 REQD LOCATE ON UNDERSIDE OF TOP SHIELD USING LOCATING FIXTURE
A
A
920006 BUTTON 7 REQ'D ATTACH TO SWITCHES AFTER INSTALLING FRONT PANEL
920545 KNOB 2 REQD
610241 GROMMET
453492 PANEL
453494 WINDOW
453528 SUPPORT
610242 NUT-CLIP 2 REQD
615059 SCREW 6-32 x 3/8 PPH 2 REQD
TOP FRAME, REF
POWER SWITCH REF SNAPS INTO FRONT PANEL
403440 CHASSIS ASSY



△ PART OF FINISHING KIT 403439

1. ASSEMBLY PROCEDURES AND PROCESSES TO CONFORM TO DANA WORKMANSHIP STANDARDS

NOTES: UNLESS OTHERWISE SPECIFIED

DANA LABORATORIES INC.
IRVINE, CALIFORNIA

ASSEMBLY- DVM 4800

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	400961	E

SCALE NONE

SHEET 2 IS AN 'A' SIZE

TO J5 PIN V

TO J5 PIN 18

TO J5-T

SEE DETAIL D

600606 TEFLON TERMINAL

600591 POST-TEST POINT TREATED

TP6 GROUND

TP5 +5

920279 XTAL PAD

600245 JUMPER

TP3 PGM. 1

TP1 F/F A

TP2 F/F B

J12

J11

J9

J8

J7

J5

J6

C7 2000 MF 35V

C6 2000 MF 35V

C10 25 50V

C8 25 50V

R46 51M

R32 RESISTOR SET 9.89975OM

R30 100K 1% 10W

R33 500Ω

R34 RESISTOR SET 99.750K

R31 20K

K4 310076

CR14 D18

Q14 SE4020

R25 1K

R24 1K

T30 403553

R29 20Ω C5 1/35V

2N3646 Q12 Q13 2N4248

T2 403553

R27 20Ω C4 1/35V

2N3646 Q10 Q11 2N4248

R45 2.37K 1%

R43 10M 10M

R42 R41 199.8Ω 17989K

R40

R69

K1 K2 K3 310063

R39 2.2Ω

R38 17.999K

R37 500Ω

R36 18K

R35 20K

Q1 2N3646

Q3 2N3640

Q2 2N3640

Q4 2N3646

Q15 FPT100

Q16 FPT100

Q17 5E4020

Q5 2N3646

R3 75Ω

R4 75Ω

CR4 LED

CR5 LED

M11 7402 M12 7473 M13 7490 M14 7490 M15 7490 M16 7490

M17 7400 M18 7402 M19 7474 M20 7473 M21 7400 M22 7440

M23 7401 M24 7404 M25 7402 M26 7474 M27 7410 M28 7404

M29 7483 M30 74192 M31 7483

R17 43K R23 400Ω R16 10K C2 680 PF

R10 5.1K R22 10K R19 5.1K

CR12 D18 CR13 D18

R26 10K

J4

E4 PURPLE E2 GREEN

CR31 SD4

E5 GRAY E6

W1

E1 E3 BLUE YELLOW

C23 6000 MF 10V

SD4

Q1 2N3646 Q3 2N3640 Q2 2N3640

Q26 2N4870 Q27 2N3640

DELAY TP7

C22 82 PF C21 150 PF C20 33 PF

C1 100 PF C18 22/6V

C3 1/35V

Y1 2.4 MHZ

C25 C24 22/6V

R67 .24 2W

P201

RED BLACK WHITE SHIELD GUARD

Q25 MJE 520

ANALOG OUT

ANALOG COM

RATIO + INPUT

RATIO COMMON

SEE DETAIL "A"

SEE DETAIL "C"

610159 STANDOFF-SWAGE ON 4-40 X 250 LG. 9 REQ'D

610487 MOUSETRAIL 4 REQ'D

600280 12 PIN CONNECTOR 5 REQ'D

600670 10 PIN CONN.

600671 6 PIN CONNECTOR 610257 STANDOFF

600348 RELAY SOCKET 4 REQ'D

453543 OPTICAL COUPLING COVER 610652 RIVET-PLASTIC DRIVE

920007 2 PLCS (CR4/5)

920006 TRANSPAD

Q32 MOUNTS ON REAR PANEL

615089 SCREW 0-32 x 3/8" PPH
617081 WASHER LK. #10
} 2 REQD-FARSIDE

5 USE PERMABOND CEMENT P/N 920008 A/R ON BOTH ENDS OF LIGHT ISOLATOR COVER TO HOLD IT FLUSH TO PC BOARD

4 INSERT AND SOLDER DO NOT BEND LEADS, 2 PLACES.

3 WHEN USING LED'S WITH 3 LEADS DISREGARD TAB ON CASE AND USE 3 HOLE PATTERN ON BOARD.

2. SCHEMATIC REFERENCE NO. 430958.

1. ASSY PROCEDURES AND PROCESSES TO CONFORM TO DANA WORKMANSHIP STANDARDS.

NOTES: UNLESS OTHERWISE SPECIFIED.

DETAIL "D" SCALE - NONE

R30 MOUNT RESISTOR .2 FROM BOARD

DETAIL 'C'

+ POLARITY

DETAIL "A" SCALE - NONE

MOUNT TRANSISTOR .35 FROM TERM.

610234 FSV TERM. REF.

P.C.B.

DANA DANA LABORATORIES INC. IRVINE, CALIFORNIA

ASSEMBLY

LOGIC & INTERCONNECTION

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403433	K

SCALE 2:1 SHEET 1 OF 12

SHEET 5 THRU 12 ARE "A" SIZE

600682
1 SEC. PUSH BUTTON SW.
2 REQ'D

SEE DETAIL 'B'

600684
3 SEC. PUSH BUTTON SW.

600683
2 SEC. PUSH BUTTON SWITCH

920468
NIXIE SOCKET
5 REQ'D
920466
NIXIE TUBE
5 REQ'D
610626
FIBER WASHER
5 REQ'D

610234
BIFURCATED TERMINAL
25 REQ'D
SEE DETAIL 'A'

SEE SHEET 3

R44 100K
R47 100K
R71 100K

S3 FILTER
S4 RATIO
S2 HOLD
S1 SINGLE
PERIODIC
S5 REMOTE
S6 PRINT

M32 7400

V1 V2 V3 V4 V5

J2
J1

R1 7.5K 1/2W
R2 7.5K 1/2W
R6 7.5K 1/2W
R9 7.5K 1/2W
R12 7.5K 1/2W

M1 7441
M2 7441
M3 7441
M4 7441

Q23 MJE 370
Q22 2N3565
Q19 2N3565
Q18 2N4248

C11 25/50V
C8 25/50V

J5
18

T1 403553
J3

R21 200Ω
R22 200Ω

Q8 2N3646
Q9 2N3646

M5 74H11
M6 7400
M7 7475
M8 7475
M9 7475
M10 7475

TP4 RESET

TO J12-12

MOUSETAIL REF

TO J9 PIN A

TO J9 PIN 11

920018
BUTTON-NYLON
11 REQ'D

600228
18 PIN CONNECTOR
1 REQ'D

453505
12 PIN MODIFIED CONN.

SEE DETAIL 'E'

SEE DETAIL 'D'

500082
RG 196/U SHIELDED CABLE
A/R APPROX 11" EA.

500009
SHRINK TUBING
A/R

524000-WIRE
A/R

524999-WIRE
A/R

CUT PINS ON TOP OF SWITCH .060 HIGH MAX. FILTER SWITCH ONLY

DETENT TAB

600682
P.B. SW.
REF.

DETAIL 'B'

NIXIE TUBE REF.

FIBER WASHER REFERENCE

NIXIE SOCKET REF.

P.C. BOARD REF.

.060 ± .018

VIEW A-A
TYP. 5 PLACES

920460
14 PIN SOCKET
23 PLACES

DESIGNATES PIN 1

DETAIL 'D'

920419
16 PIN SOCKET
11 PLACES

DETAIL 'E'

500100 SLEEVING
TEFLON A/R

3/16"

DETAIL B

MOUNT VISHAY RESISTORS R38, R40 & R41 ABOVE BOARD AS SHOWN.

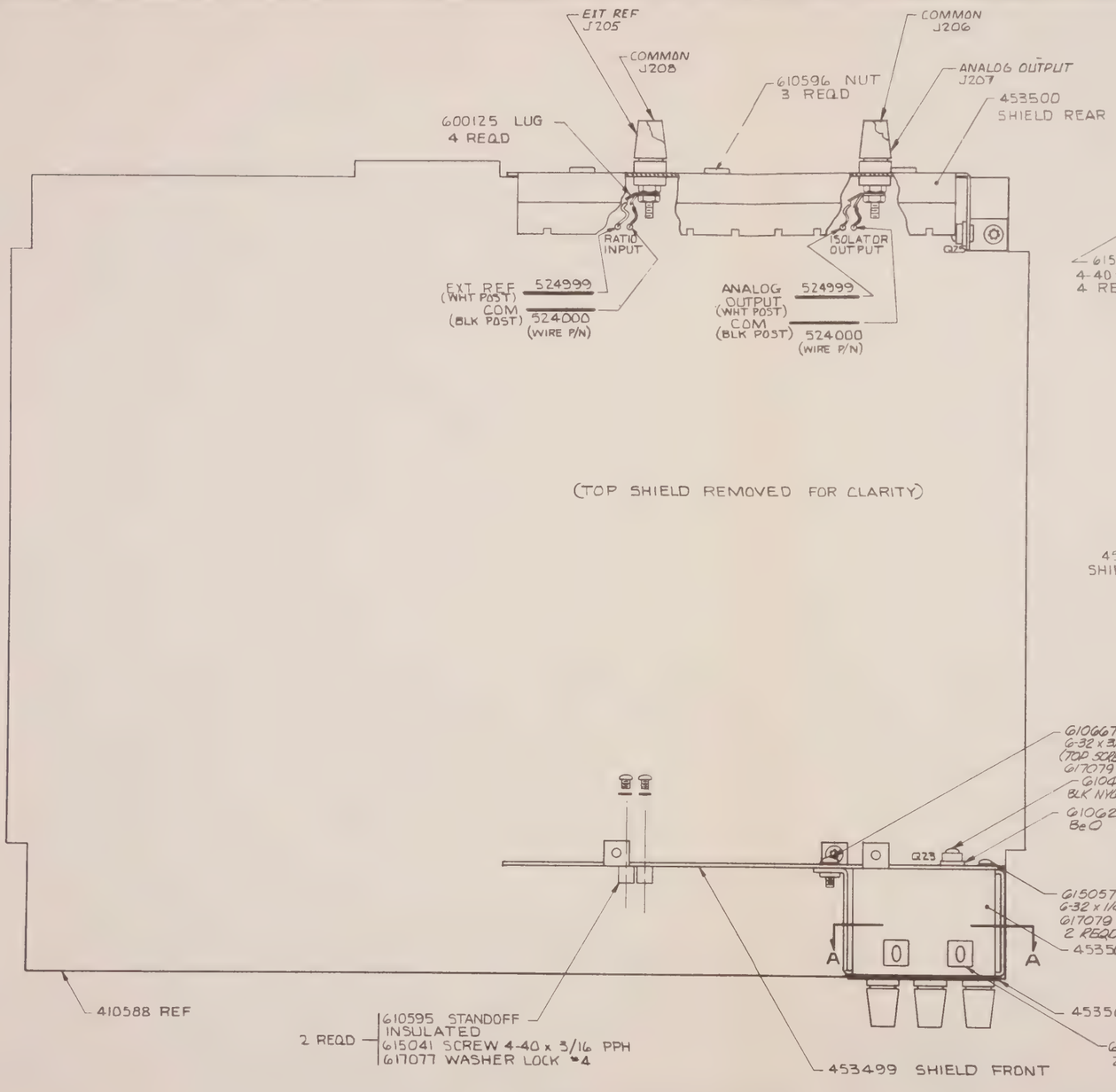
SEE SHEET 1.

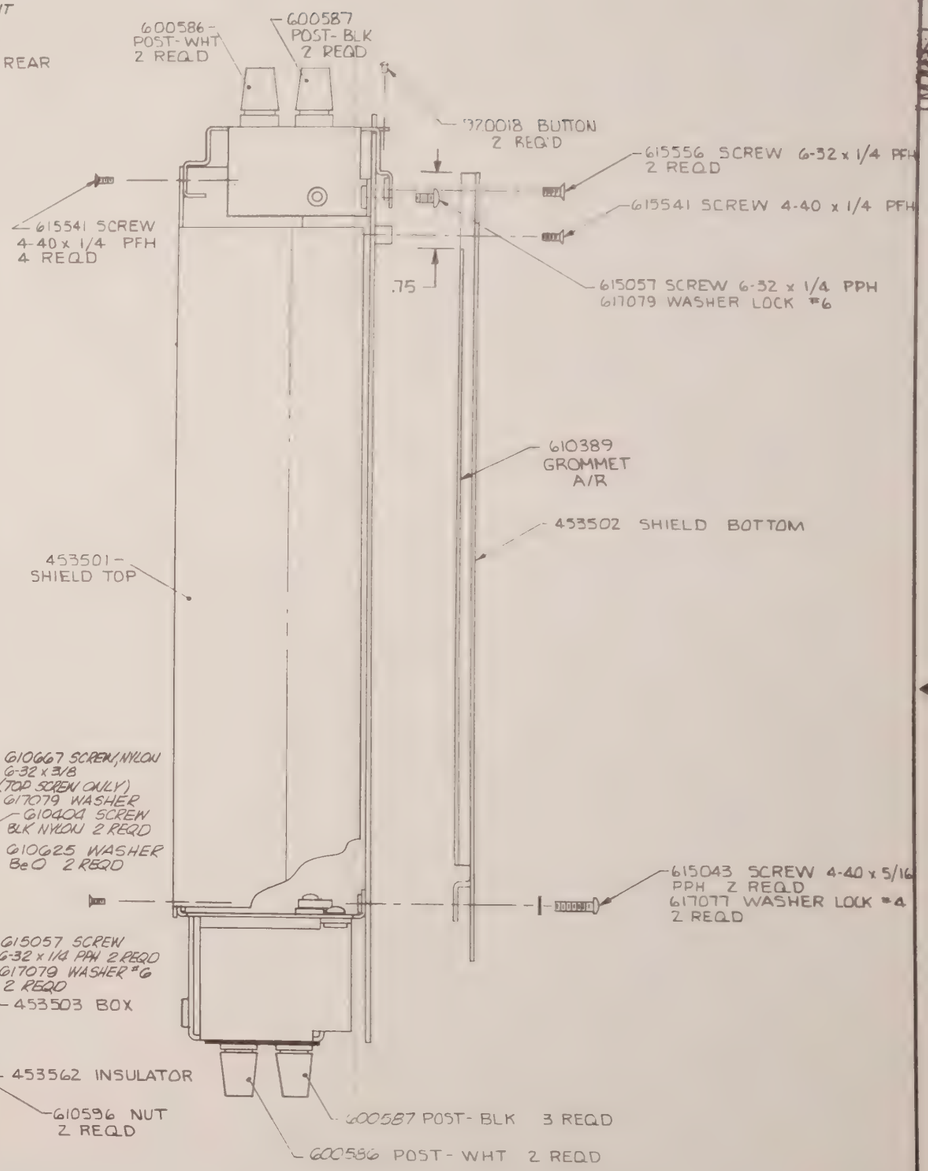
DANA LABORATORIES INC.
IRVINE, CALIFORNIA

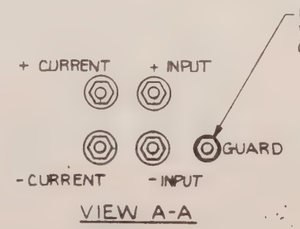
ASSEMBLY
LOGIC & INTERCONNECTION

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403433	K

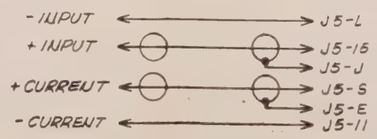
SCALE 2:1




600586 - POST-WHT 2 REQD
600587 POST-BLK 2 REQD
170018 BUTTON 2 REQD
615556 SCREW 6-32 x 1/4 PFH 2 REQD
615541 SCREW 4-40 x 1/4 PFH
615541 SCREW 4-40 x 1/4 PFH 4 REQD
.75
615057 SCREW 6-32 x 1/4 PPH
617079 WASHER LOCK #6
610389 GROMMET A/R
453502 SHIELD BOTTOM
453501 - SHIELD TOP
615043 SCREW 4-40 x 5/16 PPH 2 REQD
617077 WASHER LOCK #4 2 REQD
600587 POST-BLK 3 REQD
600586 POST-WHT 2 REQD



VIEW A-A
ROTATED 180°
REAR VIEW OF POSTS



WIRING DIAGRAM FOR POSTS IN VIEW A-A

NOTES: UNLESS OTHERWISE SPECIFIED

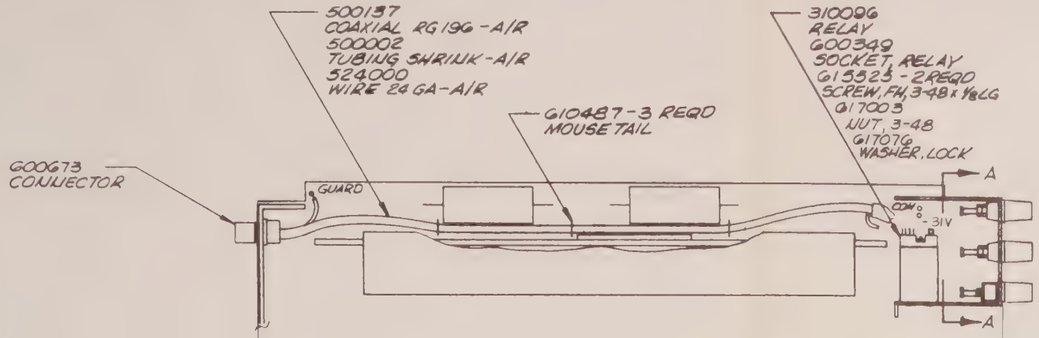
DANA DANA LABORATORIES INC.
IRVINE, CALIFORNIA

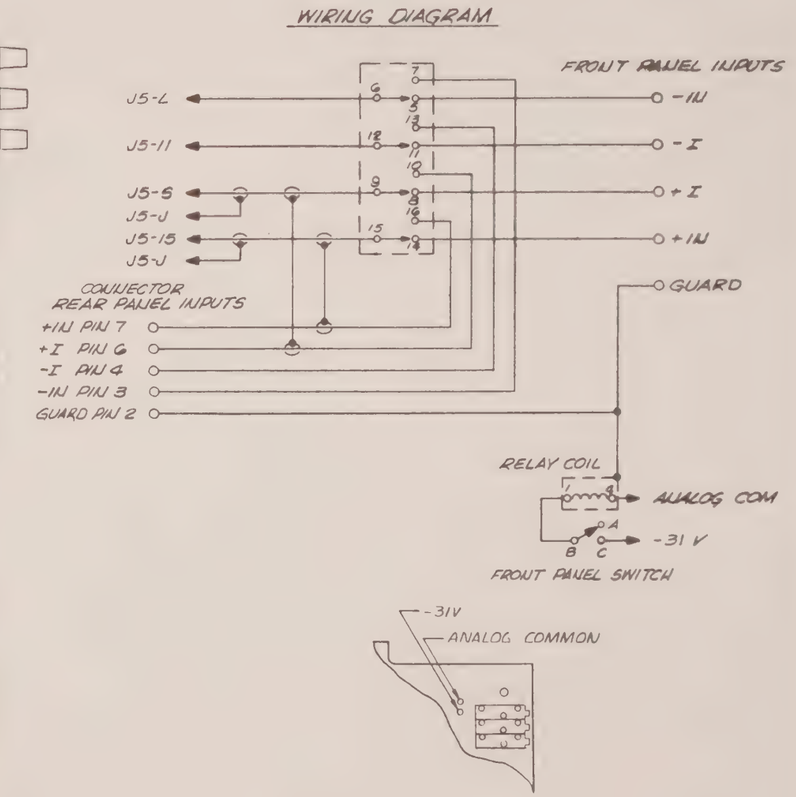
ASSEMBLY
LOGIC & INTERCONNECTION

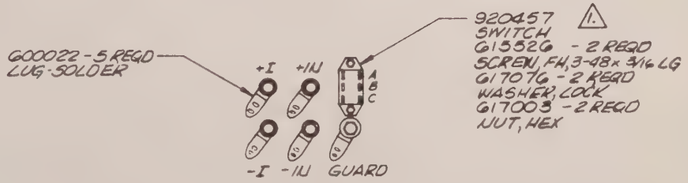
SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403433	K

SCALE 1/1 SHEET 3 OF 12

DIETERICH-POST CLEARPRINT 1000







VIEW A-A

⚠1. USE LOCTITE 920X15G ON SCREWS.

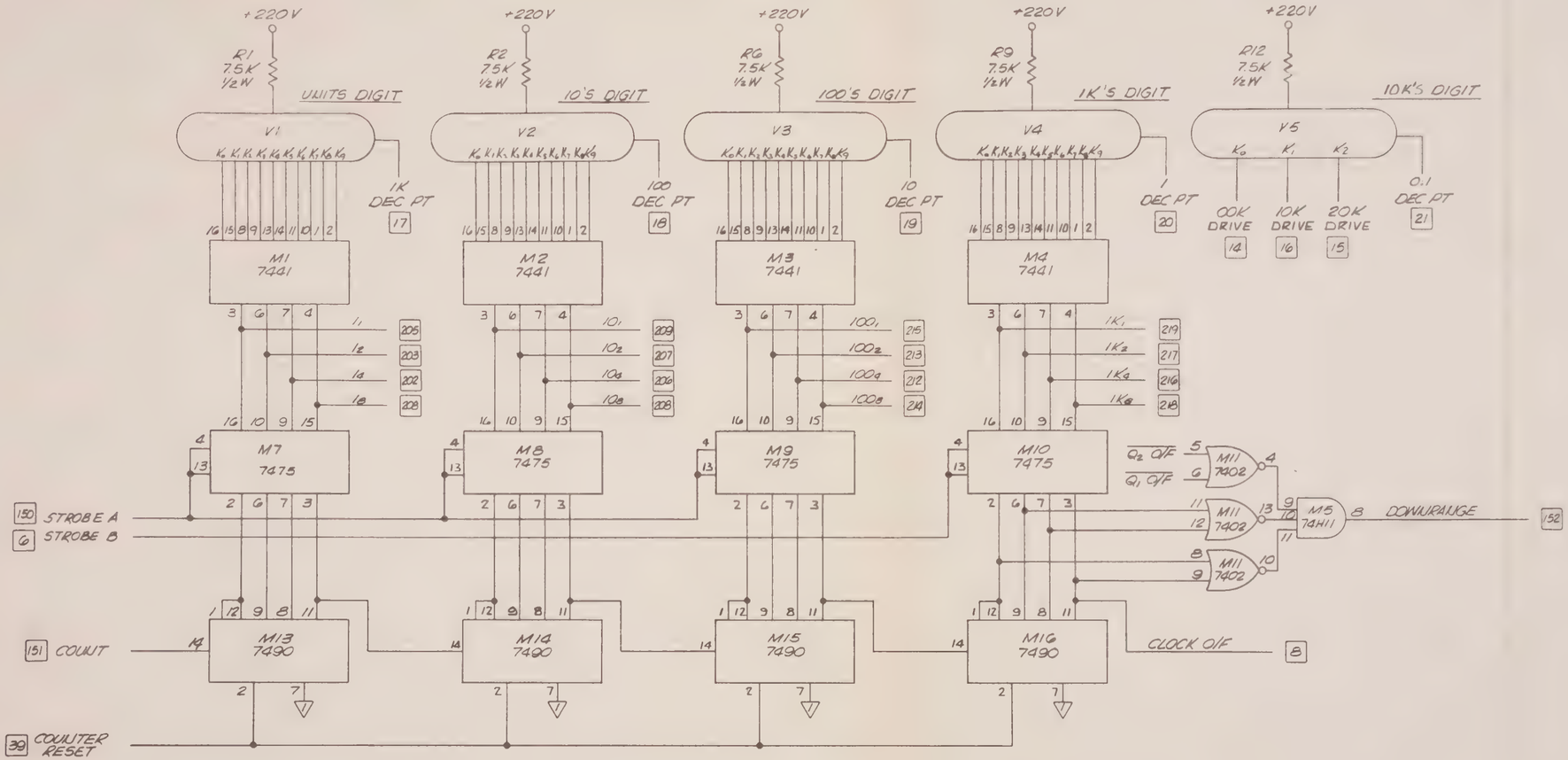
NOTES: UNLESS OTHERWISE SPECIFIED

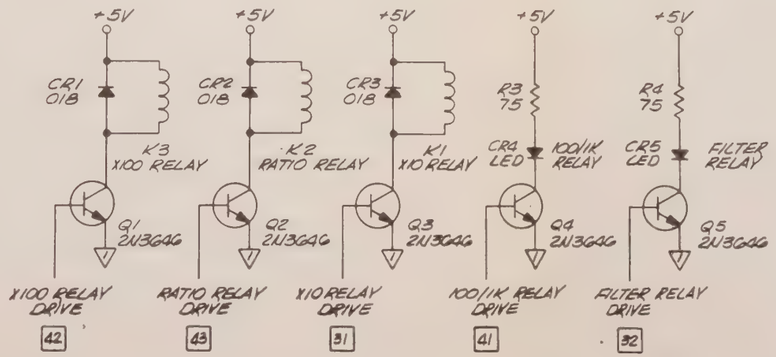
DANA LABORATORIES INC.
IRVINE, CALIFORNIA

ASSEMBLY
LOGIC & INTERCONNECTION

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403433	K

SCALE 1.000 | SHEET 4 OF 12





10. ☐ INDICATES CONNECTIONS
    1-48 — J1, J2
    100-109 — J3
    150-160 — INTERCONNECTION
    200-219 — P201
9. ANALOG COMMON IS TIED TO MECCA

⚠ TRANSISTOR TO BE MOUNTED TO REAR PANEL

7. 74192, Vcc IS ON PIN 8 & GND IS ON PIN 16
6. 7490, Vcc IS ON PIN 5 & GND IS ON PIN 10
5. 7473, Vcc IS ON PIN 4 & GND IS ON PIN 11
4. 7441, 7475, 7483, Vcc IS ON PIN 5 & GND IS ON PIN 12
3. 7400, 7401, 7402, 7404, 74H11, 7410, 7440 7474, Vcc IS ON PIN 14 & GND IS ON PIN 7
2. GROUND ⏚ DESIGNATES ANALOG GROUND
1. GROUND ▽ DESIGNATES DIGITAL GROUND

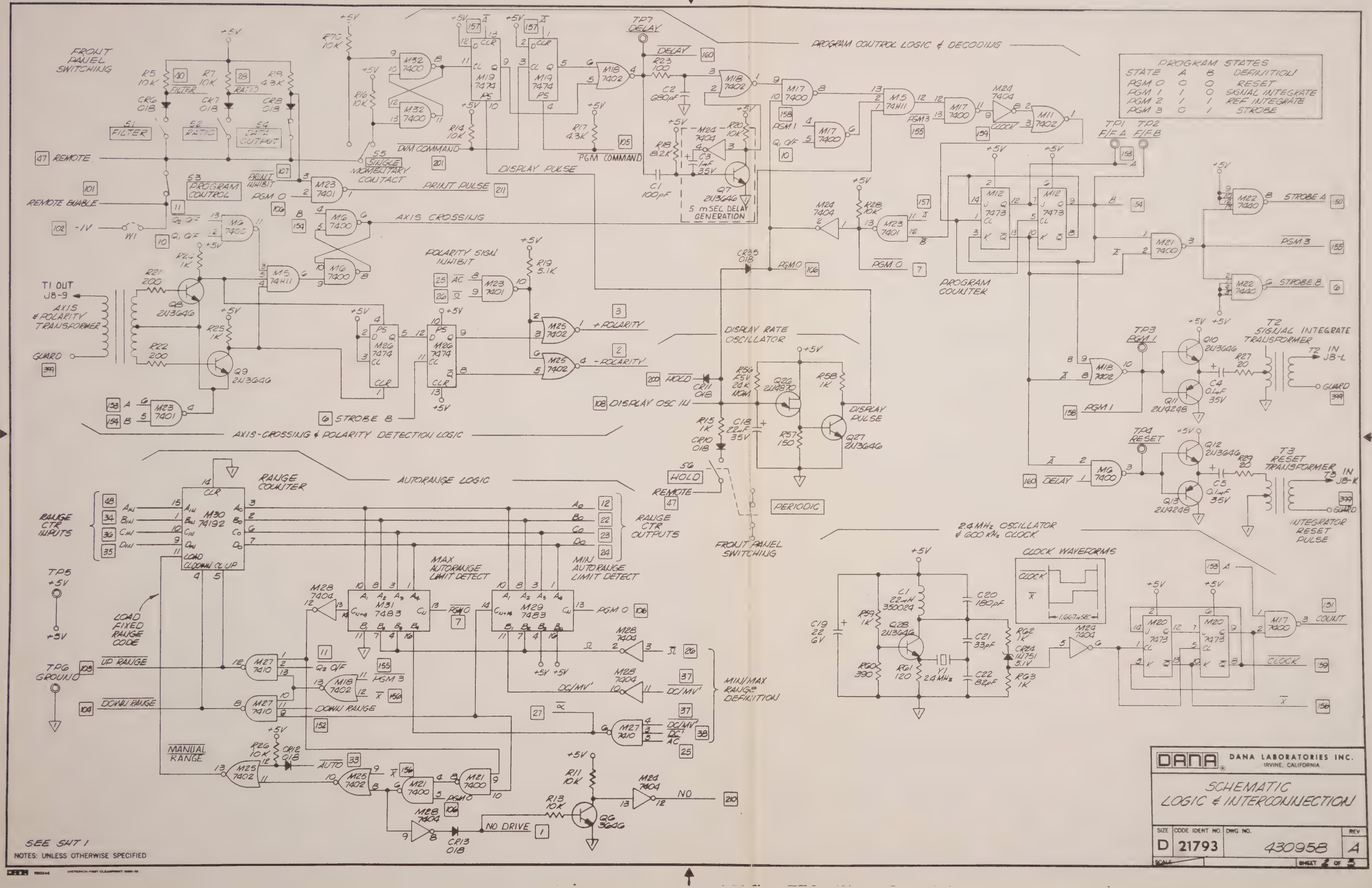
NOTES: UNLESS OTHERWISE SPECIFIED

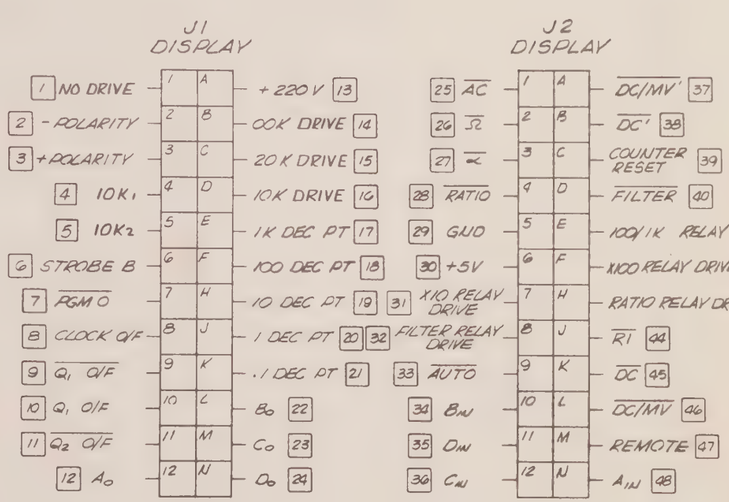
DANA DANA LABORATORIES INC.
IRVINE, CALIFORNIA

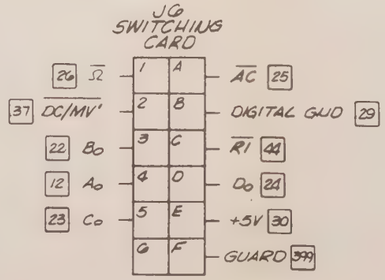
SCHEMATIC
LOGIC & INTERCONNECTION

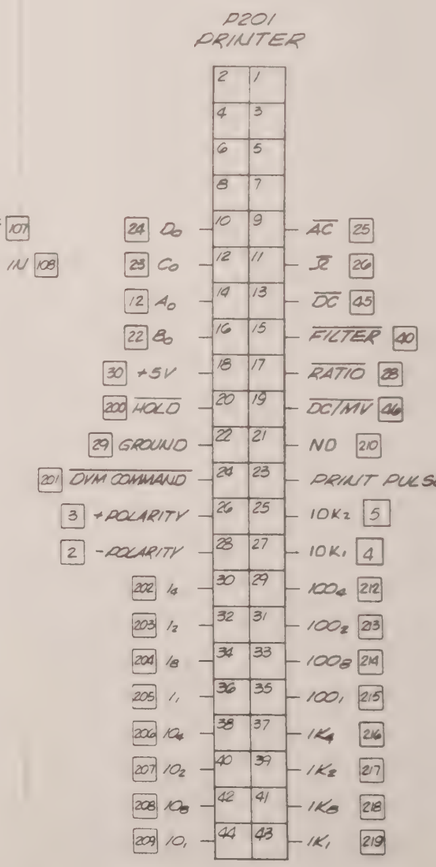
SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	430958	A

SCALE — SHEET 1 OF 3


PROGRAM CONTROL LOGIC & DECODING
PROGRAM STATES
STATE A B DEFINITION
PGM 0 0 0 RESET
PGM 1 1 0 SIGNAL INTEGRATE
PGM 2 1 1 REF INTEGRATE
PGM 3 0 1 STROBE
FRONT PANEL SWITCHING
S1 FILTER
S2 RATIO
S4 CAL OUTPUT
S5 SINGLE MOMENTARY CONTACT
S3 PROGRAM CONTROL
REMOTE
REMOTE ENABLE
-1V
DVM COMMAND
PGM COMMAND
DISPLAY PULSE
PRINT PULSE
PRINT INHIBIT
AXIS CROSSING
5 mSEC DELAY GENERATION
PROGRAM COUNTER
STROBE A
STROBE B
AXIS-CROSSING & POLARITY DETECTION LOGIC
T1 OUT J8-9
AXIS & POLARITY TRANSFORMER
POLARITY SIGN INHIBIT
+POLARITY
-POLARITY
DISPLAY RATE OSCILLATOR
DISPLAY OSC IN
DISPLAY PULSE
HOLD
REMOTE
PERIODIC
FRONT PANEL SWITCHING
T2 SIGNAL INTEGRATE TRANSFORMER
T2 IN J8-L
C4 0.1uF 35V
T3 RESET TRANSFORMER
T3 IN J8-K
C5 0.1uF 35V
INTEGRATOR RESET PULSE
AUTORANGE LOGIC
RANGE COUNTER
RANGE CTR INPUTS
RANGE CTR OUTPUTS
LOAD FIXED RANGE CODE
MAX AUTORANGE LIMIT DETECT
MIN AUTORANGE LIMIT DETECT
MIN/MAX RANGE DEFINITION
UP RANGE
DOWN RANGE
MANUAL RANGE
AUTO
NO
NO DRIVE
2.4 MHz OSCILLATOR & 600 KHz CLOCK
CLOCK WAVEFORMS
COUNT
CLOCK
SEE SHT 1
NOTES: UNLESS OTHERWISE SPECIFIED
DANA LABORATORIES INC.
IRVINE, CALIFORNIA
SCHEMATIC
LOGIC & INTERCONNECTION
SIZE D
CODE IDENT NO. 21793
DWG NO. 430958
REV A
SCALE
SHEET OF







SEE SHT 1

NOTES: UNLESS OTHERWISE SPECIFIED

DANA LABORATORIES INC.
IRVINE, CALIFORNIA

SCHEMATIC
LOGIC & INTERCONNECTION

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	430858	A

SCALE — SHEET 3 OF 5

* TIED TO BOOT STRAP COMMON ON ISOLATOR BOARD

J5 SWITCHING CARD

J7 ISOLATOR

J8 DIGITIZER

J9 MV OHMS

J11 CONVERTER

J12 SCALING AMP

MV OFFSET FRONT PANEL ADJ

DC OFFSET FRONT PANEL ADJ

RATIO RELAY

(100/1K) RELAY

AC OFFSET

100 V ADJ

1V ADJ

.1V ADJ

REAR PANEL BINDING POSTS

SEE SHT 1

NOTES: UNLESS OTHERWISE SPECIFIED

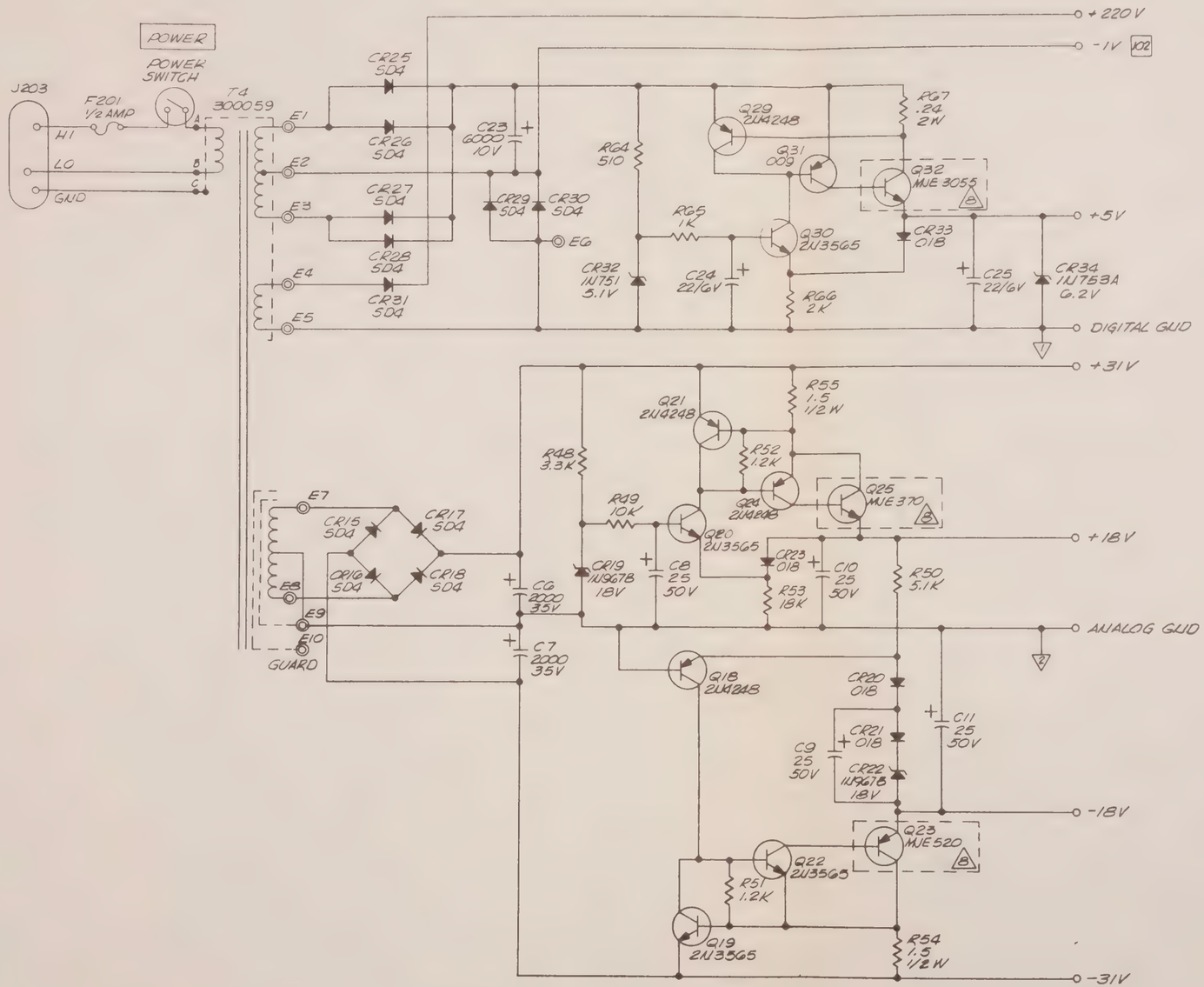
DANA LABORATORIES INC.
IRVINE, CALIFORNIA

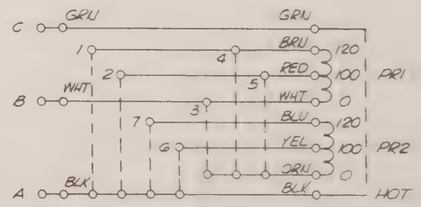
SCHEMATIC
LOGIC & INTERCONNECTION

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	430958	A

SCALE

SHEET 2 OF 3





LINE VOLTAGE	JUMPER
100 V	2-3-G
120 V	1-3-7
200 V	5-G
220 V	4-G
240 V	4-7

T4 EXPORT OPTION (300066)

SEE SHT 1

NOTES: UNLESS OTHERWISE SPECIFIED

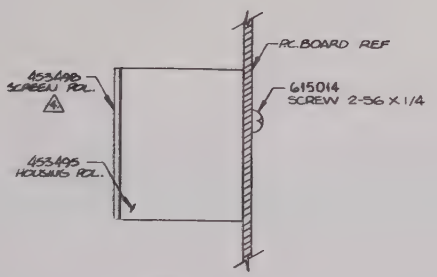
DANA LABORATORIES INC.
IRVINE, CALIFORNIA

SCHEMATIC
LOGIC & INTERCONNECTION

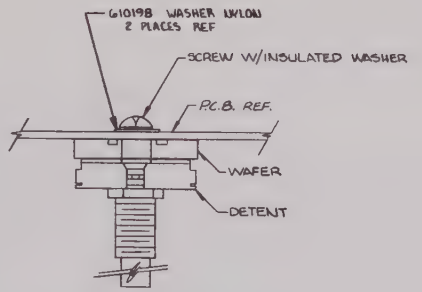
SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	430958	A

SCALE | SHEET 3 OF 5

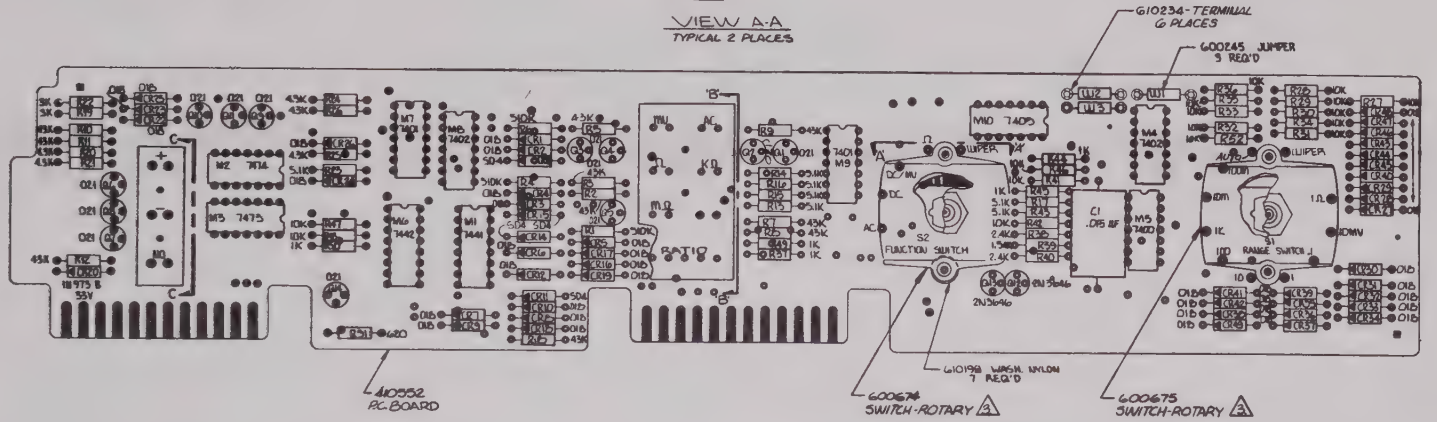
REVISIONS				
LTR	DESCRIPTION	DR	CHK	APPD
A	RELEASED PER DRN # 974			
B	ADDED R46, R52 & 2 TERMINALS PER ECO 5792			
C	CR20 WAS 111934 PER ECO 6012			
D	ADD 610198 TO P/L. PER ECO 6060			
E	REVISE HARDWARE PER ECO 6173			
F	CR20 WAS 111957 ECO. 6280			

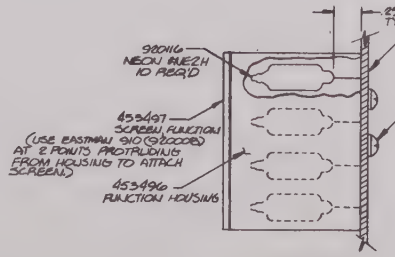


VIEW C-C



VIEW A-A
TYPICAL 2 PLACES





VIEW B-B

⚠2 USE EASTMAN 910 P/N 92000B AT 2 POINTS PROTRUDING FROM HOUSING TO ATTACH POLARITY SCREEN.

⚠3 DETENT PART OF SWITCH SHALL BE TURNED FULL COUNTER CLOCK WISE BEFORE FINAL MATING WITH WAFER.

2 SCHEMATIC REF. # 450957

1. ASSY PROCESSES AND PROCEDURES TO CONFORM TO DANA WORKMANSHIP STANDARDS.

NOTES: UNLESS OTHERWISE SPECIFIED.

403440	4000		
NEXT DWG	USED ON	NEXT ASSY	FINAL ASSY
APPLICATION		QTY REQD	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING

TOLERANCES

DECIMALS	ANGLES	HOLE DIAMETERS
X.030	0° 30' FORBID	+.004
XX.020	1° 0'	-.001
XXX.010		

DIMENSIONS AND TOLERANCES PER USAS Y14.15

MATERIAL | FINISH

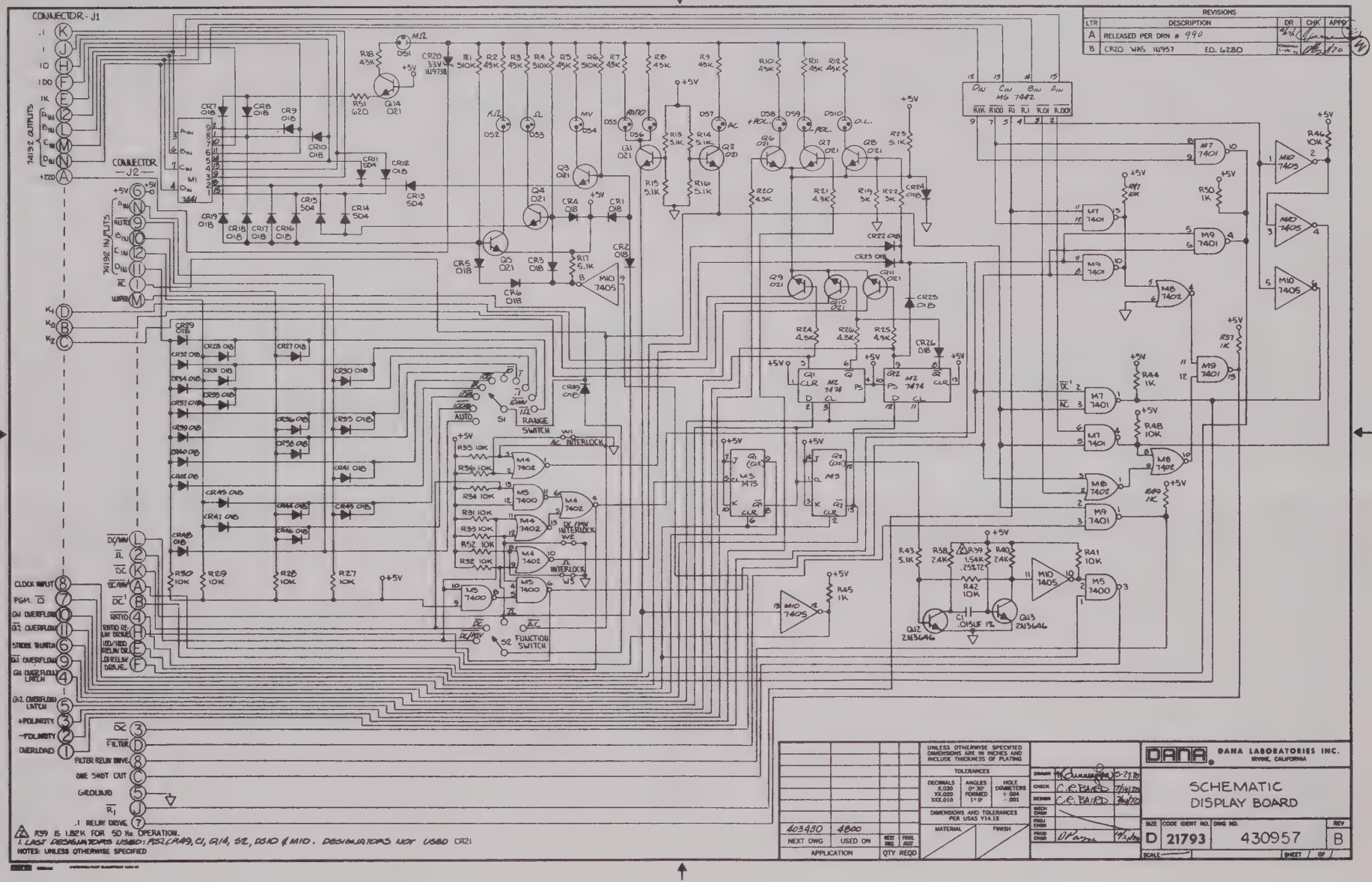
DRAWN	K. [illegible]	4-17-70
CHECK	C.P. BAIRD	4/4/70
DESIGN	[illegible]	4-21-70
MECH ENGR		
PROJ ENGR	H. Sullette	4-27-70
PROD ENGR	[illegible]	4/29/70

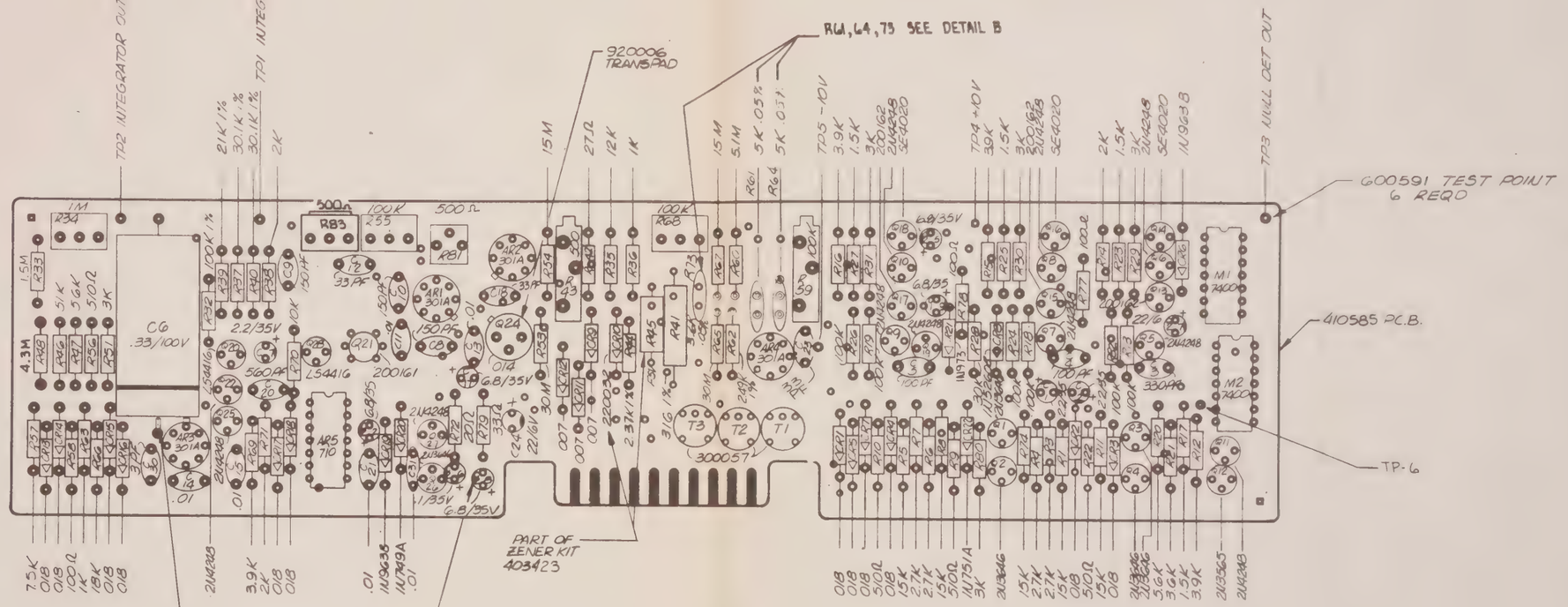
DANA LABORATORIES INC.
IRVINE, CALIFORNIA

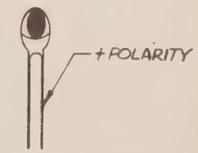
ASSY
DISPLAY BOARD

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403430	F

SCALE 2:1 SHEET 1 OF 4

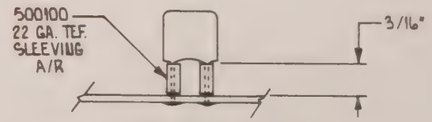

CONNECTOR - J1
CONNECTOR J2
74192 OUTPUTS
74192 INPUTS
REVISIONS
LTR DESCRIPTION DR CHK APPD
A RELEASED PER DRN # 990
B CR20 WAS 1N1957 ED. 6280
DANA LABORATORIES INC.
IRVINE, CALIFORNIA
SCHEMATIC
DISPLAY BOARD
SIZE D
CODE IDENT NO. 21793
DWG NO. 430957
REV B
403430
4800
NEXT DWG
USED ON
APPLICATION
QTY REQD
RANGE SWITCH
FUNCTION SWITCH
AC INTERLOCK
DC/MM INTERLOCK
Ω INTERLOCK
CLOCK INPUT
PGM. D
Q0 OVERFLOW
Q2 OVERFLOW
STROBE BUFFER
Q1 OVERFLOW
Q0 OVERFLOW LATCH
Q2 OVERFLOW LATCH
+POLARITY
-POLARITY
OVERLOAD
FILTER RELAY DRIVE
ONE SHOT OUT
GROUND
.1 RELAY DRIVE
NOTES: UNLESS OTHERWISE SPECIFIED
1. LAST DESIGNATORS USED: R52, CR49, C1, Q14, S2, DS10 & M10. DESIGNATORS NOT USED CR21
2. R39 IS 1.82K FOR 50 Hz OPERATION.





DETAIL "A"

TYP FOR AR1, AR2, AR3, AR4



DETAIL D

MOUNT VISHAY RESISTORS RG1, 64 & 73 ABOVE PCB AS SHOWN.

2. SCHEMATIC REF. # 430949
1. ASSEMBLY PROCESSES & PROCEDURES TO CONFORM TO DANA WORKMANSHIP STANDARDS.

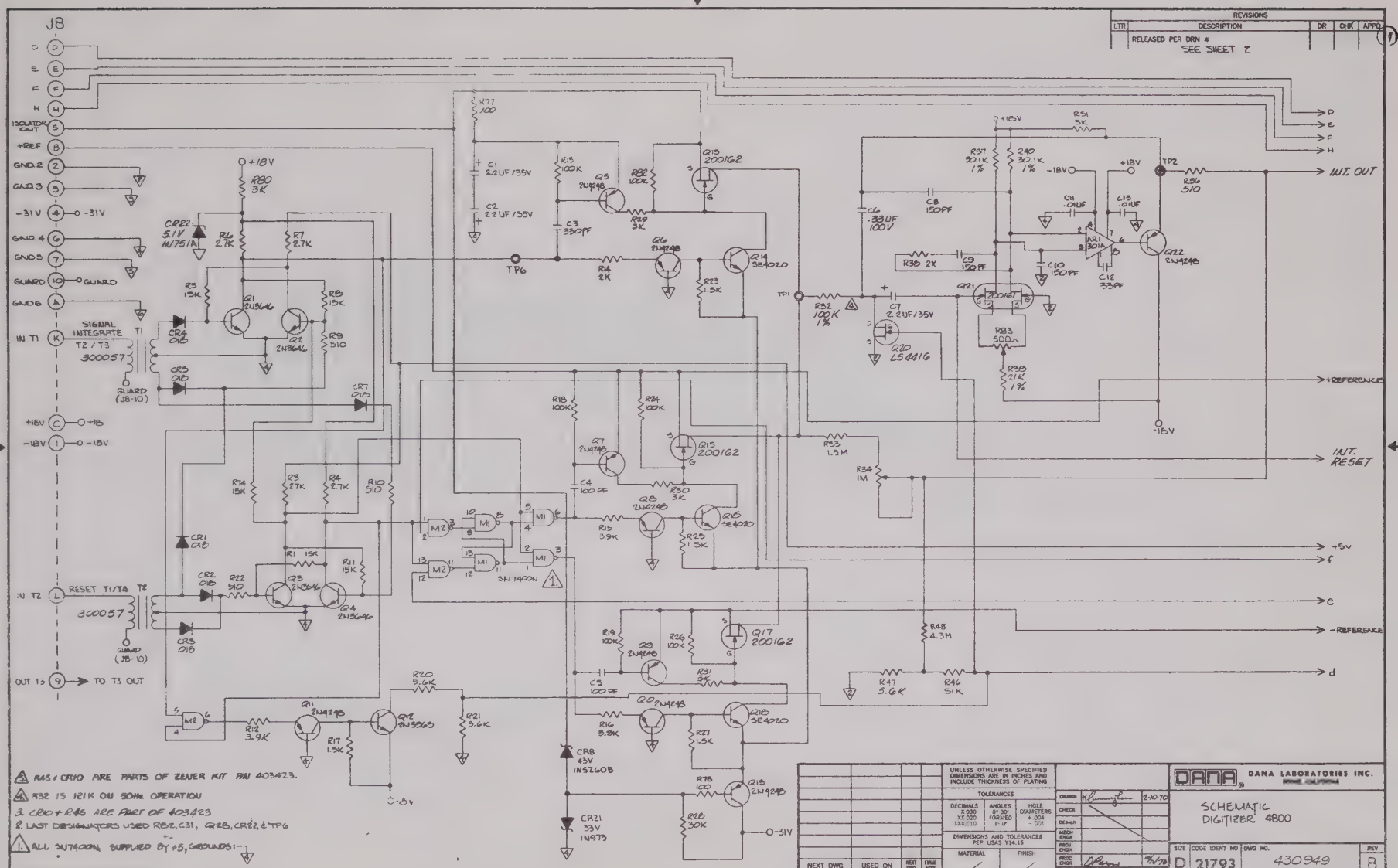
NOTES: UNLESS OTHERWISE NOTED

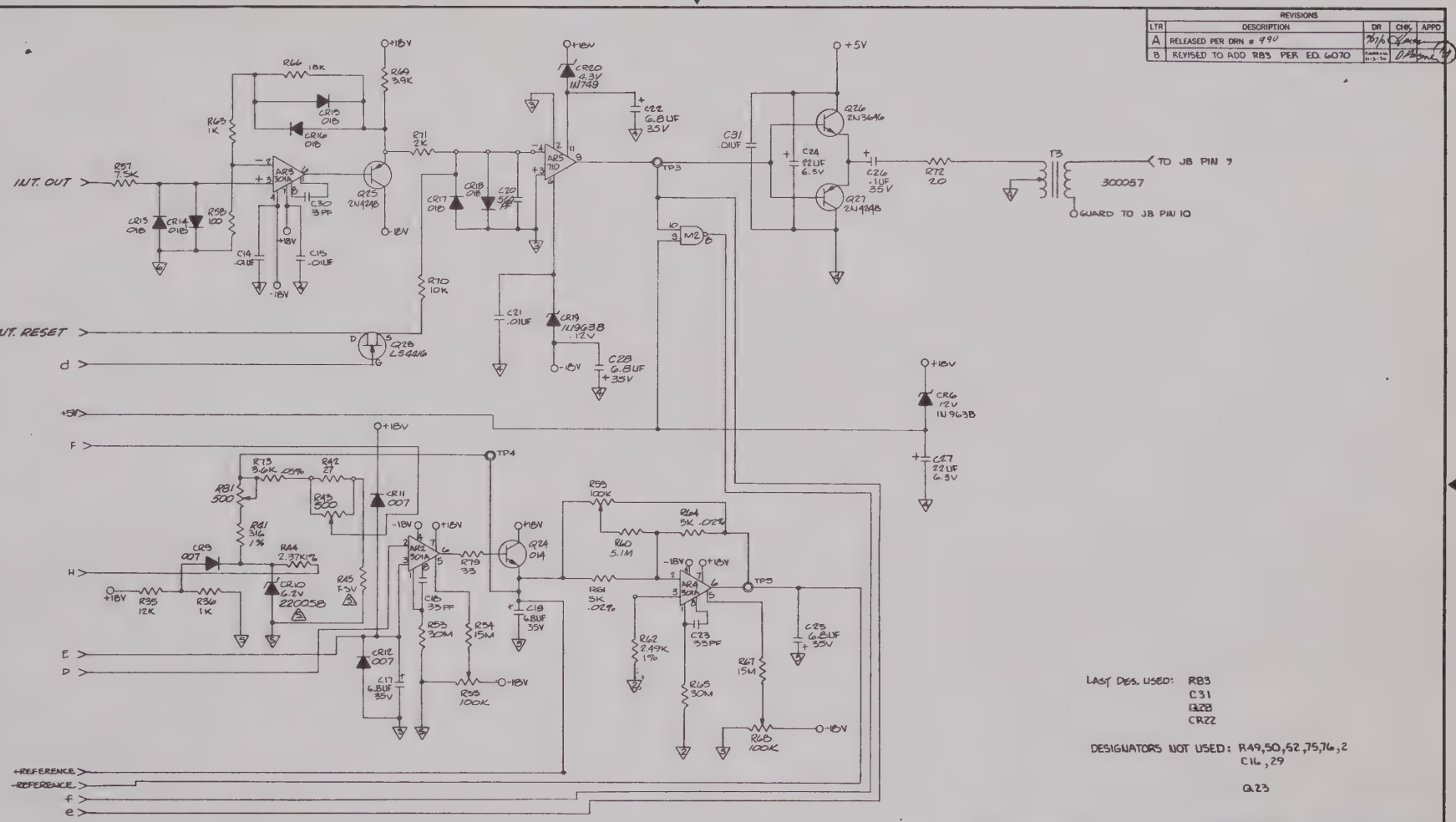
DANA DANA LABORATORIES INC. IRVINE, CALIFORNIA

ASSEMBLY
DIGITIZER

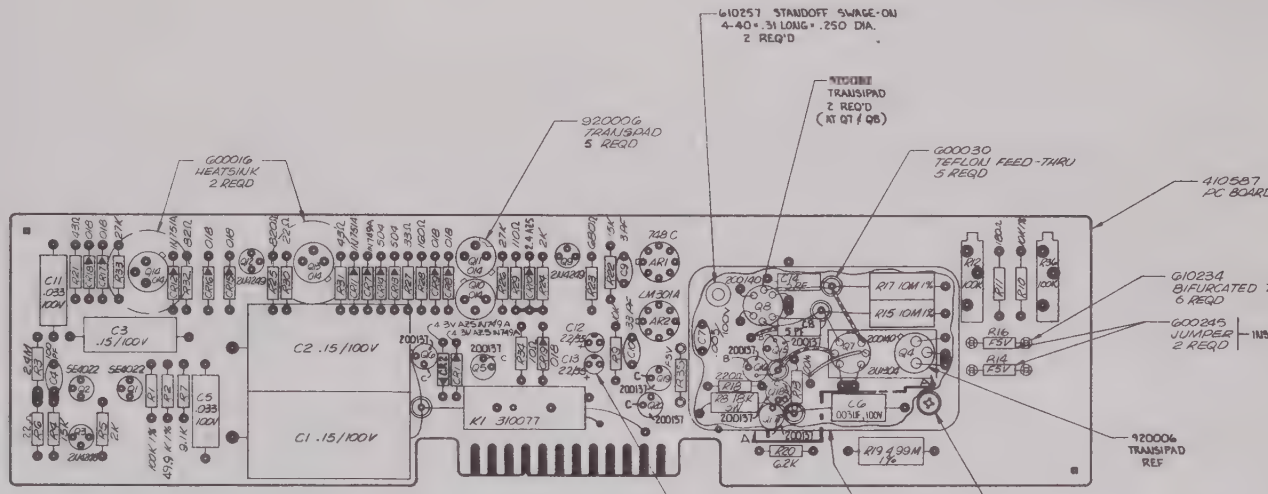
SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403432	D

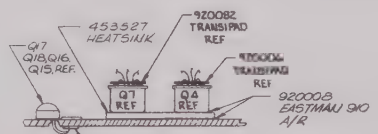
SCALE 2:1 SHEET 1 OF 5

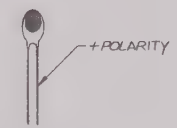

J8
REVISIONS
LTR DESCRIPTION DR CHK APPD
RELEASED PER DRN # SEE SHEET 2
ISOLATOR OUT
+REF
GND 2
GND 3
-31V
GND 4
GND 5
GUARD
GND 6
SIGNAL INTEGRATE
IN T1
RESET T1/T4
IN T2
OUT T3
TO T3 OUT
+18V
-18V
0 +18
0 -18V
0 -31V
0 GUARD
GUARD (J8-10)
300057
T1
T2
T3
T4
INT. OUT
+REFERENCE
INT. RESET
+5V
-REFERENCE
SN74OON
1. ALL SN74OON SUPPLIED BY +5, GROUNDS.
2. R32 IS 121K ON 50Hz OPERATION
3. CR10 + R46 ARE PART OF 403423
4. R43, CR10 ARE PARTS OF ZENER KIT PN 403423.
NOTES. UNLESS OTHERWISE SPECIFIED
DANA DANA LABORATORIES INC.
SCHEMATIC DIGITIZER 4800
SIZE D
CODE IDENT NO 21793
DWG NO. 430949
REV B
SCALE
SHEET 1 OF 2


REVISIONS
LTR | DESCRIPTION | DR | CHK | APPD
A | RELEASED PER DRN # 990 | 7/7/6
B | REVISED TO ADD RB3 PER ED. 6070 | 11-3-76
INT. OUT
INT. RESET
+18V
-18V
+5V
+5
+REFERENCE
-REFERENCE
TO JB PIN 9
GUARD TO JB PIN 10
300057
LAST DES. USED: R83 C31 Q28 CR22
DESIGNATORS NOT USED: R49,50,52,75,76,2 C16,29 Q23
SEE SHEET 1.
NOTES: UNLESS OTHERWISE SPECIFIED
DANA LABORATORIES INC. IRVINE, CALIFORNIA
SCHEMATIC DIGITIZER 4800
SIZE D | CODE IDENT NO. 21793 | DWG NO. 430949 | REV B
SHEET 2 OF 2

REVISIONS				
LTR	DESCRIPTION	DR	CHK	APPD
A	RELEASED PER DRN # 9745	5/24/70		
B	ROD HARDWARE, NOTES PER E.O. 5925	[illegible] 6-15-70		
C	CR1 #2 WERE 1N746, PER E.O. 5986	[illegible] 9-28-70		
D	REVISED PER E.O. 6142	[illegible] 1-15-71		


610257 STANDOFF SWAGE-ON 4-40 x .31 LONG x .250 DIA. 2 REQ'D
TRANSIPAD 2 REQ'D (AT Q7 & Q8)
920006 TRANSIPAD 5 REQD
600030 TEFLON FEED-THRU 5 REQD
410587 PC BOARD
600116 HEATSINK 2 REQD
610234 BIFURCATED TERMINAL 6 REQD
600245 JUMPER 2 REQD
INSTALL DURING ASSY.
C2 .15/100V
C1 .15/100V
K1 310077
920006 TRANSIPAD REF
SEE DETAIL "A" TYP.
452312 ENVIRONMENTAL COVER-ISOLATOR
615043 SCREW 4-40 x 5/16
617077 LOCKWASHER #4
617102 FLAT WASHER #4
2 PLACES





DETAIL "A"

SECTION A-A

3. SCHEMATIC REFERENCE 430951.

2. SLEEVING INSULATES TRANSISTORS FROM P.C. BOARD, AND MUST TOUCH BODY OF TRANSISTOR.

1. CUT EMITTER LEADS OF Q15, Q16, Q17, Q18, Q19, Q6, Q5, AND Q20 OFF AT CASE

NOTES: UNLESS OTHERWISE SPECIFIED

403440	4800		
NEXT DWG	USED ON	NEXT ASSY	FINAL ASSY
APPLICATION		QTY REQD	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING

TOLERANCES

DECIMALS	ANGLES	HOLE DIAMETERS
X .030 XX .020 XXX .010	0° 30' FORMED 1° 0'	+.004 -.001

DIMENSIONS AND TOLERANCES PER USAS Y14.15

MATERIAL | FINISH

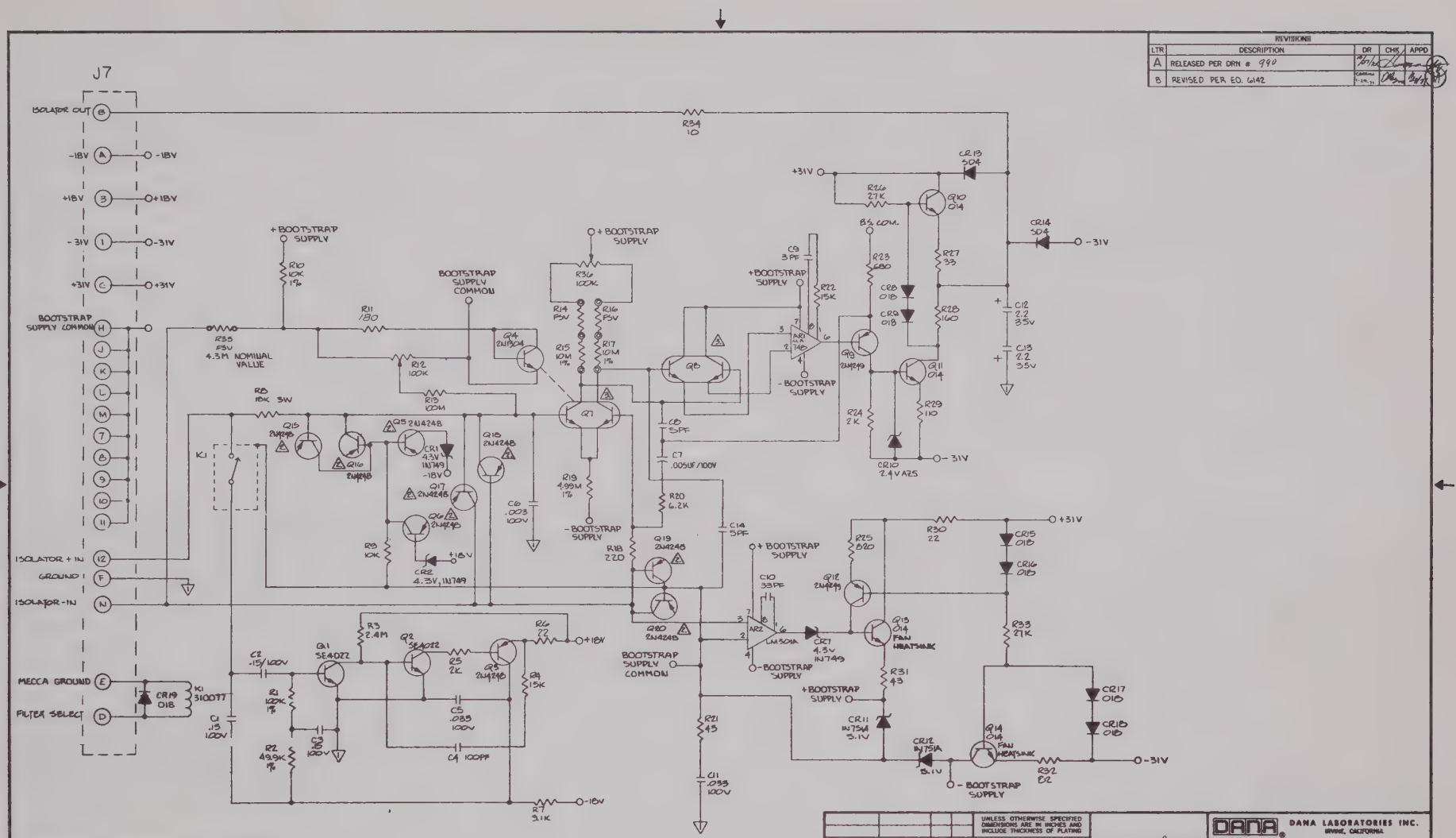
DRAWN	[illegible]	6/16/70
CHECK	C R BAIRD	9/14/70
DESIGN	[illegible]	9/14/70
MECH ENGR		
PROJ ENGR	[illegible]	9/21/70
PROD ENGR	[illegible]	9/28/70

DANA DANA LABORATORIES INC.
IRVINE, CALIFORNIA

ASSY PC BOARD ISOLATOR

SIZE	CODE IDENT NO	DWG NO	REV
D	21793	403434	D

SCALE 2:1 SHEET 1 OF 1



REVISIONS				
LTR	DESCRIPTION	DR	CHK	APPD
A	RELEASED PER DRN # 990	2/17/70		
B	REVISED PER E.O. 6142	1-29-71		

3. ALL RESISTORS ARE IN OHMS, ±5%, 1/4W CARBON.
4. CR3, CR4, CR5 & CR6 NOT USED.
⚠2 DANA P/N 200140
⚠3 DANA P/N 200137
5. LAST DESIGNATORS USED R36, C14, CR19, Q20, K1, & AR2
NOTES: UNLESS OTHERWISE SPECIFIED

408 434	4800		
NEXT DWG	USED ON	NEXT ASSY	FINAL ASSY
APPLICATION		QTY REQD	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING
TOLERANCES
DECIMALS: X.030, XX.020, XXX.010 | ANGLES: 0° 30' FORMED 1°0' | HOLE DIAMETERS: +.004 −.001
DIMENSIONS AND TOLERANCES PER USAS Y14.15
MATERIAL / FINISH

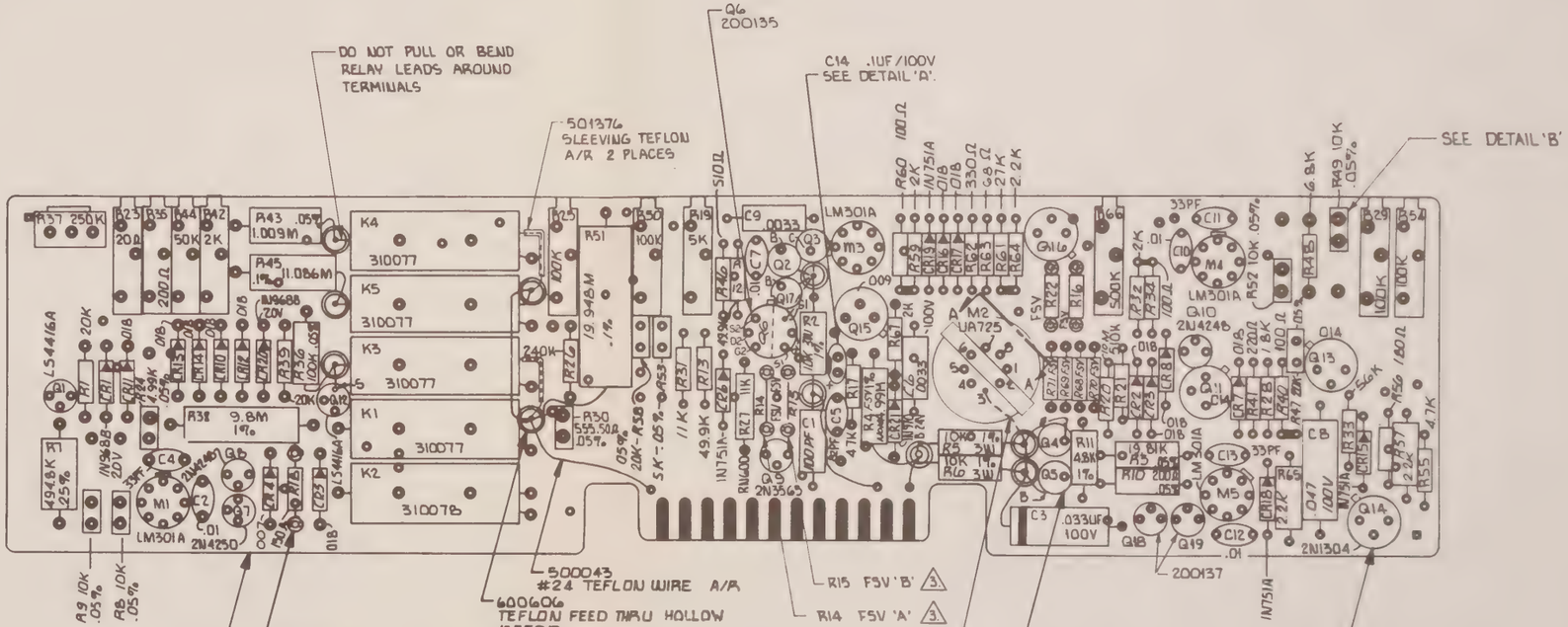
DRAWN	K Linnenfelser	2/4/70
CHECK	C.R. BAIRD	2/4/70
DESIGN		
MECH ENGR		
PROJ ENGR		
PROD ENGR	D Pa...	2/4/70

DANA LABORATORIES INC.
IRVINE, CALIFORNIA

SCHEMATIC
±20V INPUT ISOLATOR 4800

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	430951	B

SCALE —— SHEET OF



4. SCHEMATIC REFERENCE 430950.

3 IF THE FET, Q6, P/N 200135 IS MARKED 'A' THE 'FSV' RESISTOR IN THE KIT SHOULD BE INSTALLED AT R14 AND THE JUMPER AT R15. IF IT IS MARKED 'B' THE 'FSV' RESISTOR IS INSERTED AT R15 AND THE JUMPER AS R14.

2. _____

1. ASSEMBLY PROCESSES AND PROCEDURES TO CONFORM TO DANA WORKMANSHIP STANDARDS.

NOTES: UNLESS OTHERWISE SPECIFIED.

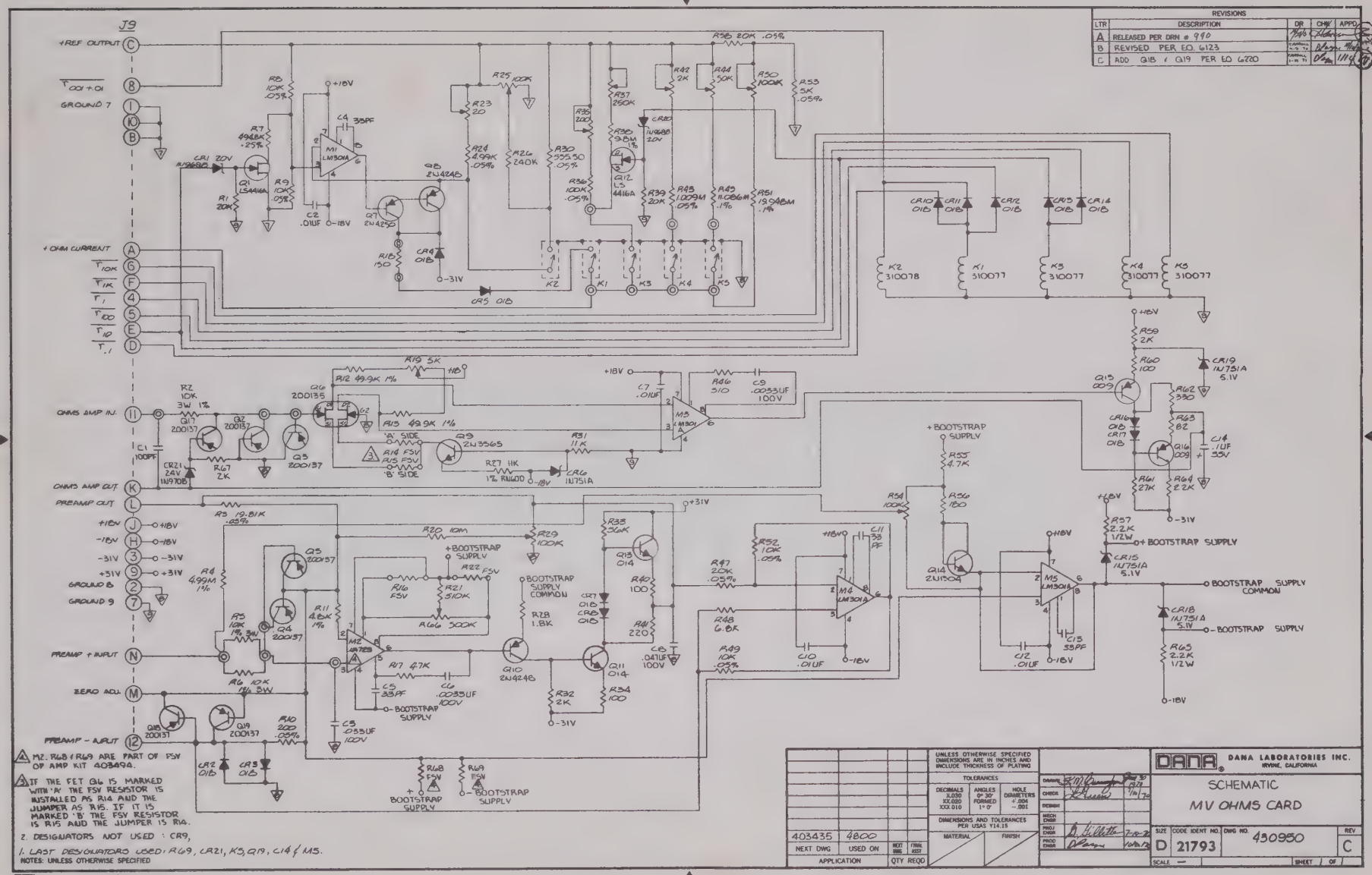
DANA LABORATORIES INC.
IRVINE, CALIFORNIA

ASSEMBLY MV OHMS ACCESSORY

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403435	K

SCALE 2:1 SHEET 1 OF 6

SHEETS 2 THRU 6 ARE A SIZE



REVISIONS				
LTR	DESCRIPTION	DR	CHK	APPD
A	RELEASED PER DRN # 990			
B	REVISED PER E.O. 6123			
C	ADD Q18 & Q19 PER E.O. 6220			

⚠4 M2, R68 & R69 ARE PART OF FSV OP AMP KIT 403498.

⚠3 IF THE FET Q6 IS MARKED WITH 'A' THE FSV RESISTOR IS INSTALLED AS R16 AND THE JUMPER AS R15. IF IT IS MARKED 'B' THE FSV RESISTOR IS R15 AND THE JUMPER IS R16.

2. DESIGNATORS NOT USED : CR9,

1. LAST DESIGNATORS USED: R69, CR21, K5, Q19, C14 & M5.

NOTES: UNLESS OTHERWISE SPECIFIED

403435	4800		
NEXT DWG	USED ON	NEXT ASSY	FINAL ASSY
APPLICATION		QTY REQD	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING

TOLERANCES

DECIMALS	ANGLES	HOLE DIAMETERS
X.030	0° 30' FORMED	+.004
XX.020	1° 0'	-.001
XXX.010		

DIMENSIONS AND TOLERANCES PER USAS Y14.15

MATERIAL | FINISH

DRAWN	K.M. Quinn	7/27/71
CHECK	W.B. Hall	11/1/71
DESIGN		
MECH ENGR		
PROJ ENGR	D. Gillette	7-8-72
PROD ENGR	D. Dana	10/8/72

DANA DANA LABORATORIES INC. IRVINE, CALIFORNIA

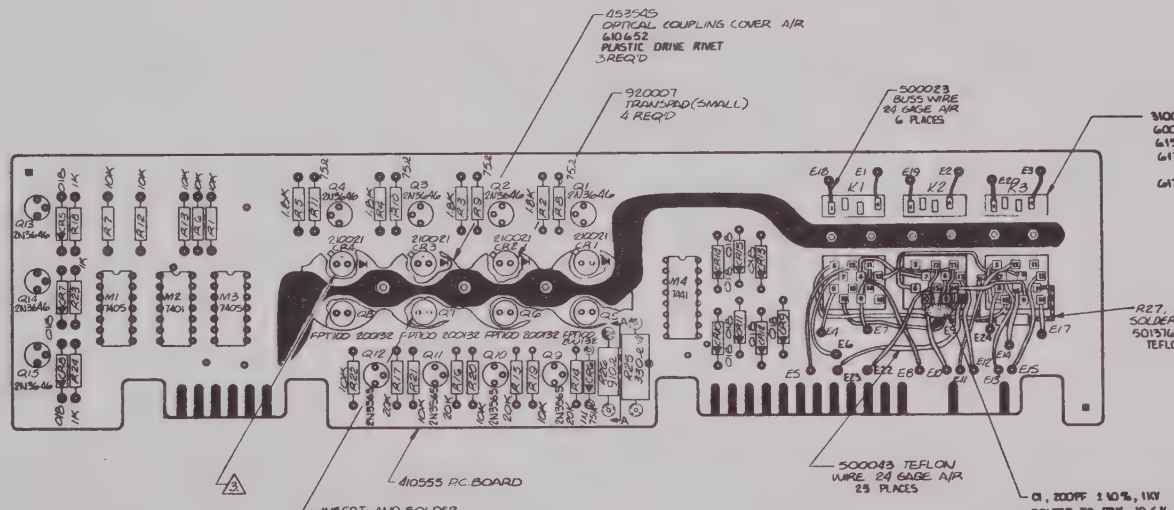
SCHEMATIC

MV OHMS CARD

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	430950	C

SCALE — SHEET 1 OF 1

REVISIONS				
LTR	DESCRIPTION	DR	CHK	APPD
A	RELEASED PER DRN # 9774			
B	CORRECT VALUES FOR R25, 26, 27 CORRECT VIEW OF L.E.D.'S E.O. 6013			
C	CORRECT REF. DESIGNATORS IN P/L PER E.O. 6124			
D	610632 WAS 610566 PER E.O. 6223			
E	K2 WAS 2 POLE, ADD C1 PER E.O. 6238			


853545 OPTICAL COUPLING COVER A/R
610652 PLASTIC DRIVE RIVET 3 REQ'D
920007 TRANSPAD (SMALL) 4 REQ'D
500023 BUSS WIRE 24 GAGE A/R 6 PLACES
310060 RELAY 4 POLE
600349 RELAY SOCKET
615029 SCR. 8-48 x .312 LG SS
617003 HEX NUT #8 SS 2 REQ'D
617076 LOCKWASHER INT. TOOTH 2 REQ'D
3 PLACES
R27, 3M SOLDER TO PINS 7 & 14. 503176 SLEEVING 20 GA TEFLON ON BOTH LEADS
410555 P.C. BOARD
INSERT AND SOLDER DONOT BEND LEADS. 4 PLACES
500043 TEFLON WIRE 24 GAGE A/R 23 PLACES
C1, 200PF ±10%, 1KV SOLDER TO PINS 10 & 16

VIEW A-A

⚠3 WHEN USING LED'S WITH 3 LEADS DISREGARD TAB ON CASE AND USE 3 HOLE PATTERN ON BOARD.

2. SCHEMATIC REF. NO. 4309-2

1. ASSEMBLY PROCESSES AND PROCEDURES TO CONFORM TO DANA WORKMANSHIP STANDARDS.

NOTES: UNLESS OTHERWISE SPECIFIED:

403440	4800						
NEXT DWG	USED ON	NEXT ASSY	FINAL ASSY				
APPLICATION		QTY REQD					

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING

TOLERANCES

DECIMALS	ANGLES	HOLE DIAMETERS
X.020	0° 30'	
XX.020	FORMED	+.004
XXX.010	1° 0'	-.001

DIMENSIONS AND TOLERANCES PER USAS Y14.15-66

MATERIAL | FINISH

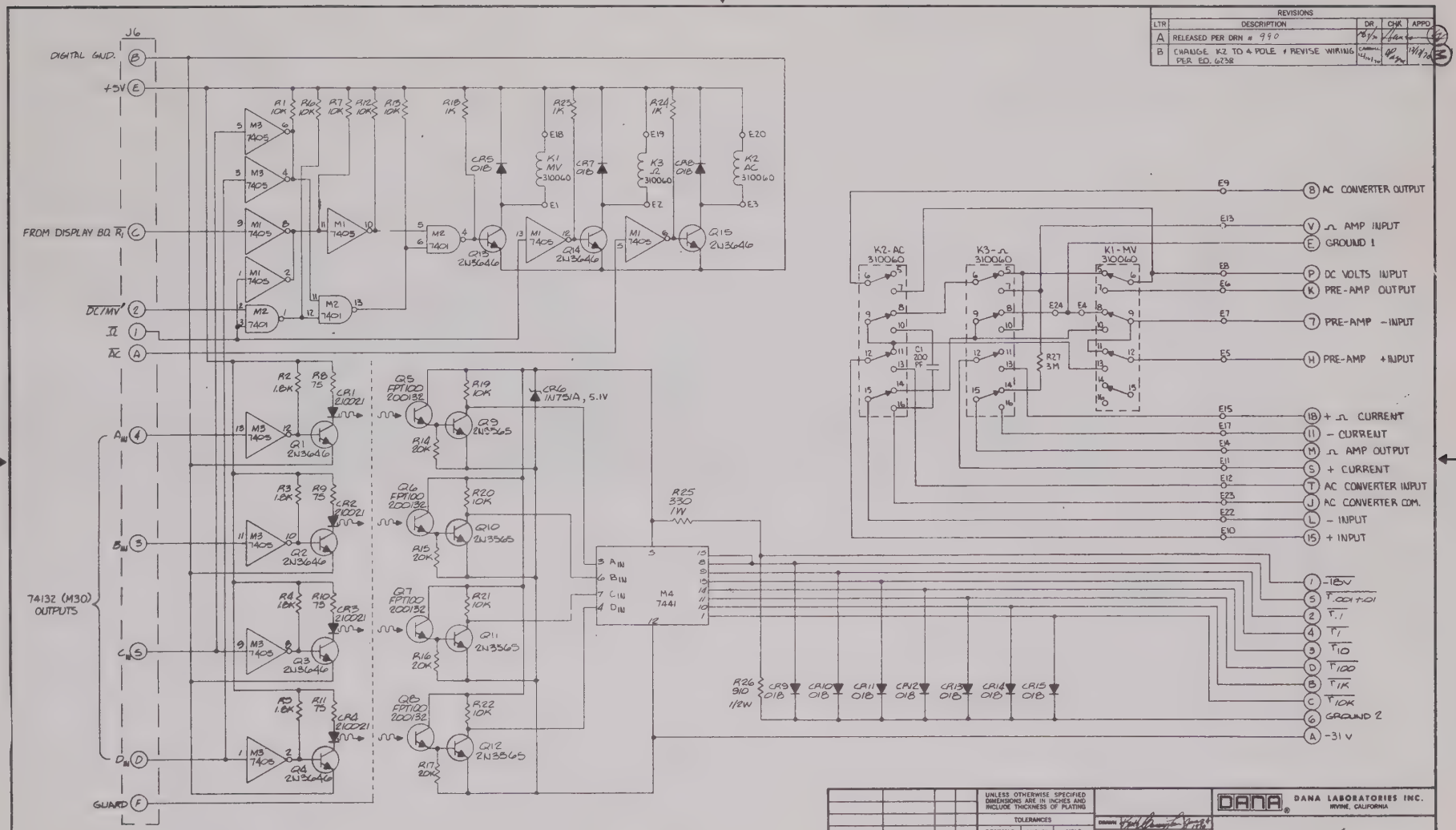
DRAWN	[illegible]	6-17-70
CHECK	[illegible]	6/19/70
DESIGN	[illegible]	6/19/70
MECH ENGR		
PROJ ENGR	G. Gillette	6/21/70
PROD ENGR	[illegible]	6/22/70

DANA LABORATORIES INC.
IRVINE CALIFORNIA

ASSEMBLY SWITCHING CARD

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403431	E

SCALE 2 : 1 | SHEET 1 OF 3



REVISIONS				
LTR	DESCRIPTION	DR.	CHK.	APPD.
A	RELEASED PER DRN # 990	[illegible]	[illegible]	[illegible]
B	CHANGE K2 TO 4 POLE & REVISE WIRING PER ED. 6238	[illegible]	[illegible]	[illegible]

2. ALL RESISTORS ARE IN OHMS, 1/4 W CARBON ±5%.
1. LAST DESIGNATORS USED: R27, CR15, Q15, K3 AND M4.
NOTES: UNLESS OTHERWISE SPECIFIED

403451	4800		
NEXT DWG	USED ON	NEXT ASSY	FINAL ASSY
APPLICATION		QTY REQD	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING

TOLERANCES

DECIMALS	ANGLES	HOLE DIAMETERS
X.030	0° 30' FORMED	±.004
XX.020	1° 0'	±.001
XXX.010		

DIMENSIONS AND TOLERANCES PER USAS Y14.15

MATERIAL | FINISH

DESIGN	[illegible]
CHECK	
DETAILER	
MECH ENGR	
PROJ ENGR	
PROD ENGR	[illegible]

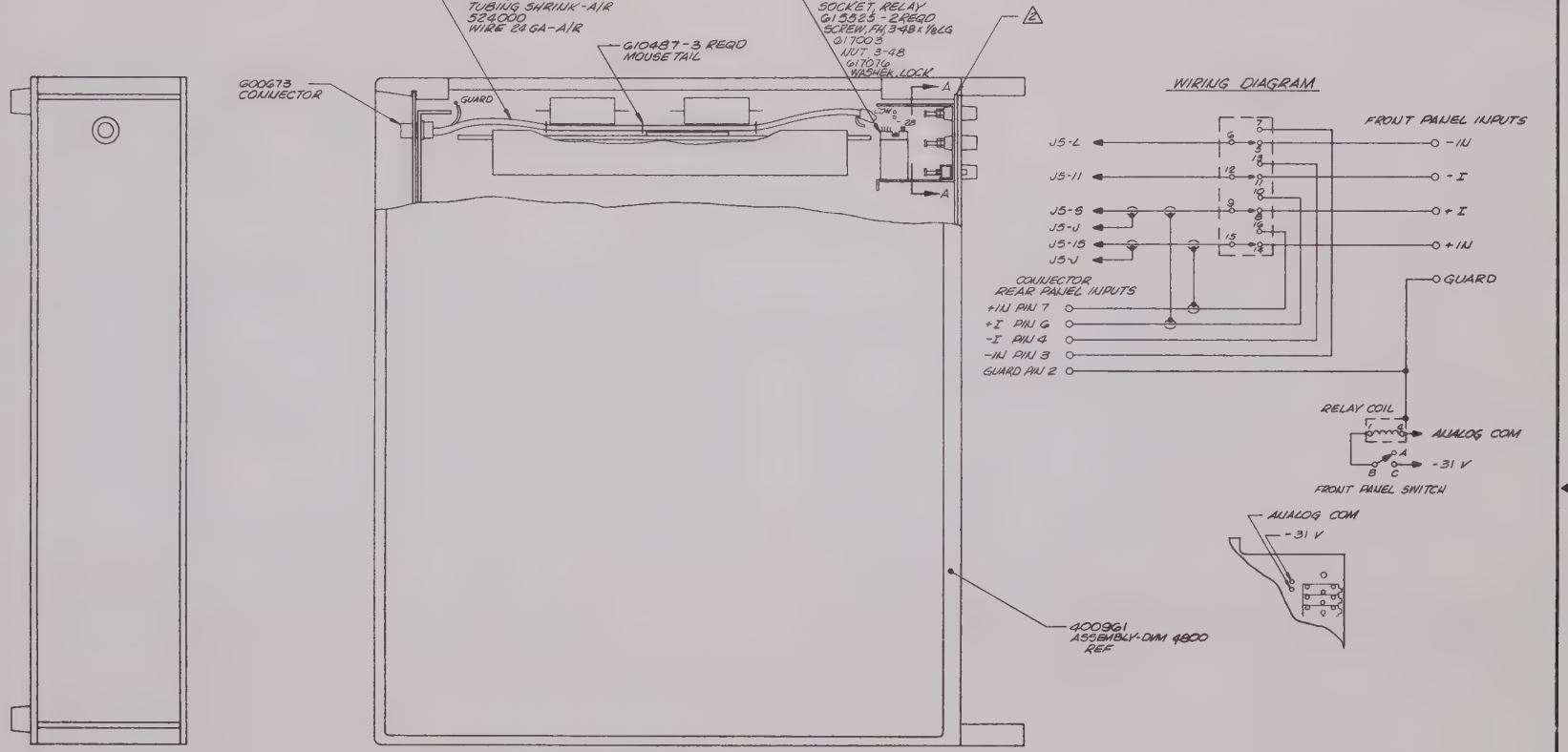
DANA DANA LABORATORIES INC.
IRVINE, CALIFORNIA

SCHEMATIC SWITCHING CARD

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	430952	B

SCALE NONE | SHEET 1 OF 1

REVISIONS				
LTR	DESCRIPTION	DR	CHK	APPD
A	RELEASED PER DRN # 995	7/6/71		



4. USE LOCTITE 92005G ON SCREWS
3. REPLACE WASHER G10G39 WITH G10G15
2. REPLACE PANEL 453492 WITH 453G24
1. ASSEMBLY PROCEDURES AND PROCESSES TO CONFORM TO DANA WORKMANSHIP STANDARDS

NOTES: UNLESS OTHERWISE SPECIFIED

NEXT DWG	USED ON	NEXT DWG	FINAL ASST
APPLICATION	4800	QTY REQD	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING

TOLERANCES

DECIMALS	ANGLES	HOLE DIAMETERS
X.030	0° 30'	+.004
XX.020	FORMED	-.001
XXX.010	1° 0'	

DIMENSIONS AND TOLERANCES PER USAS Y14.15

MATERIAL | FINISH

DRAWN		7/6/70
CHECK		7/6/70
DESIGN		7/6/70
MECH ENGR		
PROJ ENGR		9/10/70
PROD ENGR		10/2/70

DANA DANA LABORATORIES INC.
IRVINE, CALIFORNIA

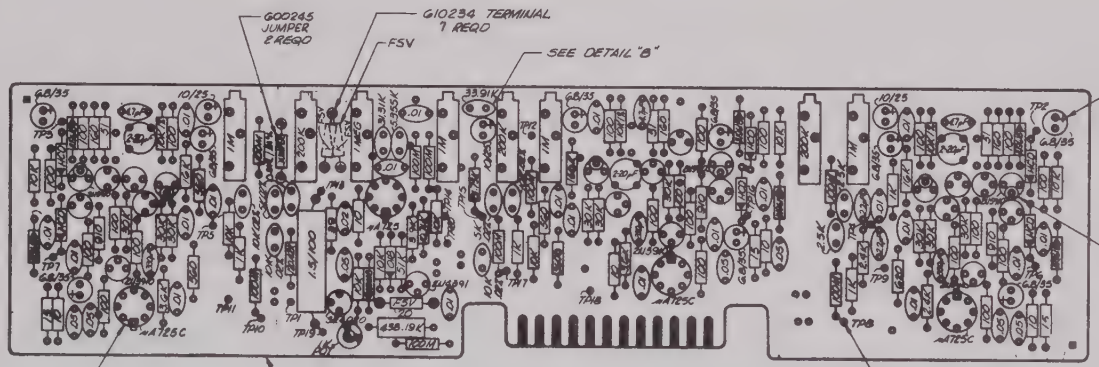
ACCESSORY ASSY
REAR INPUT - 4800

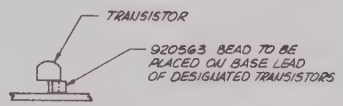
SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403502	A

SCALE NONE | SHEET 1 OF 2

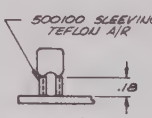
SIT 2 15 AU "A" 3/28

REVISIONS				
LTR	DESCRIPTION	DR	CHK	APP
A	RELEASED PER DRN # 997	Jan 7 '71		
B	C17, C18 & C51 WERE .05 μF. R112 WAS A JUMPER, R116 WAS 11 OHM	E.O. 6347		
C	REVISED PER E.O. 6409	4 DEC 3-12-71		





DETAIL A
6 PLACES



DETAIL B

MOUNT VISHAY RESISTORS R1, R2, R6, R7, R9, R67, R70, R72, R73 R78, R79, R82 ABOVE PC BOARD AS SHOWN

DETAIL C

4. HCD IS 210035 P/N
3. ALL TRANSISTORS THAT DO NOT HAVE A VALUE CALLED OUT ARE SE3005
2. ASSEMBLY PROCEDURES AND PROCESSES TO CONFORM TO DANA WORKMANSHIP STANDARDS
1. REF SCHEMATIC 430964

NOTES: UNLESS OTHERWISE SPECIFIED

403440	4800		
NEXT DWG	USED ON	REQ'D DWG	FINAL ASSY
APPLICATION		QTY REQD	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING

TOLERANCES

DECIMALS	ANGLES	HOLE DIAMETERS
X.030	0° 30'	+ .004
XX.020	FORMED	- .001
XXX.010	1° 0'	

DIMENSIONS AND TOLERANCES PER USAS Y14.18

MATERIAL | FINISH

DRAWN	[illegible]	11/10/70
CHECK	Jim Mc Kenzie	11/12/70
DESIGN	[illegible]	11/10/70
MECH ENGR		
PROJ ENGR	[illegible]	11/18/71
PROD ENGR	[illegible]	11/19/71

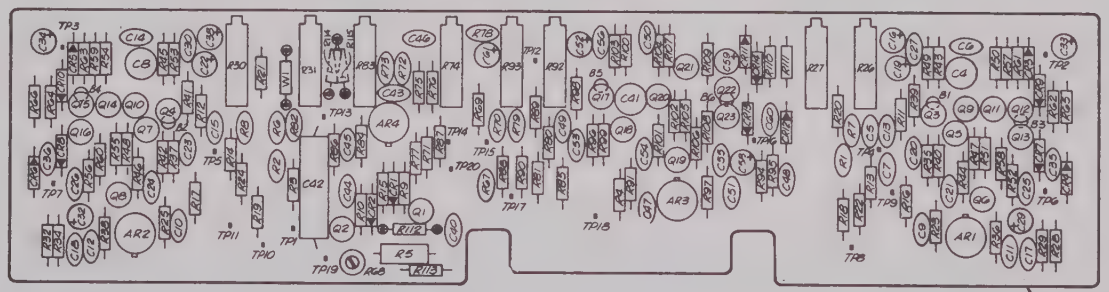
DANA LABORATORIES INC.
IRVINE, CALIFORNIA

AC CONVERTER ASSEMBLY

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403470	C

SCALE 2:1 SHEET 1 OF 1

REVISIONS				
LTR	DESCRIPTION	DR	CHK	APP
	RELEASED PER DRN = SEE SHEET 1			



410601 PC BOARD

1. ASSEMBLY PROCEDURES AND PROCESSES TO CONFORM TO DANA WORKMANSHIP STANDARDS
1. REF SCHEMATIC 430964

NOTES: UNLESS OTHERWISE SPECIFIED

403440	4800			
NEXT DWG	USED ON	NEXT DWG	FINAL ASSY	
APPLICATION		QTY REQD		

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING

TOLERANCES

DECIMALS	ANGLES	HOLE DIAMETERS
X .030	0 30'	.004
XX .020	FORMED 1 0°	.001
XXX .010		

DIMENSIONS AND TOLERANCES PER USAS Y14.5

MATERIAL | FINISH

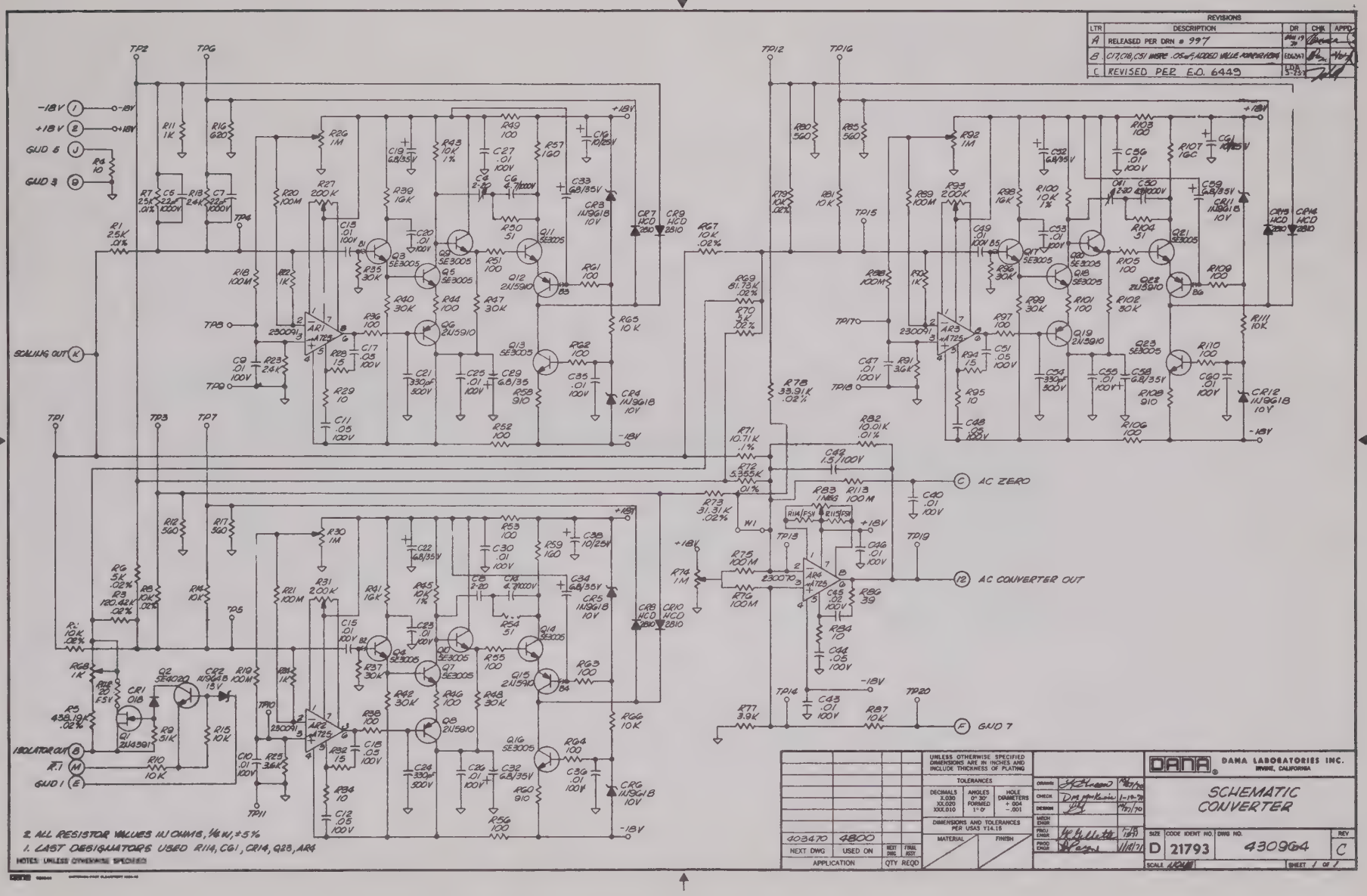
DRAWN	[signature]	11/7/70
CHECK	D M Monkman	11/3/71
DESIGN	[signature]	11/7/70
MECH ENGR		
PROJ ENGR	[signature]	11/3/70
PROD ENGR	[signature]	11/17/71

DANA DANA LABORATORIES INC.
IRVINE, CALIFORNIA

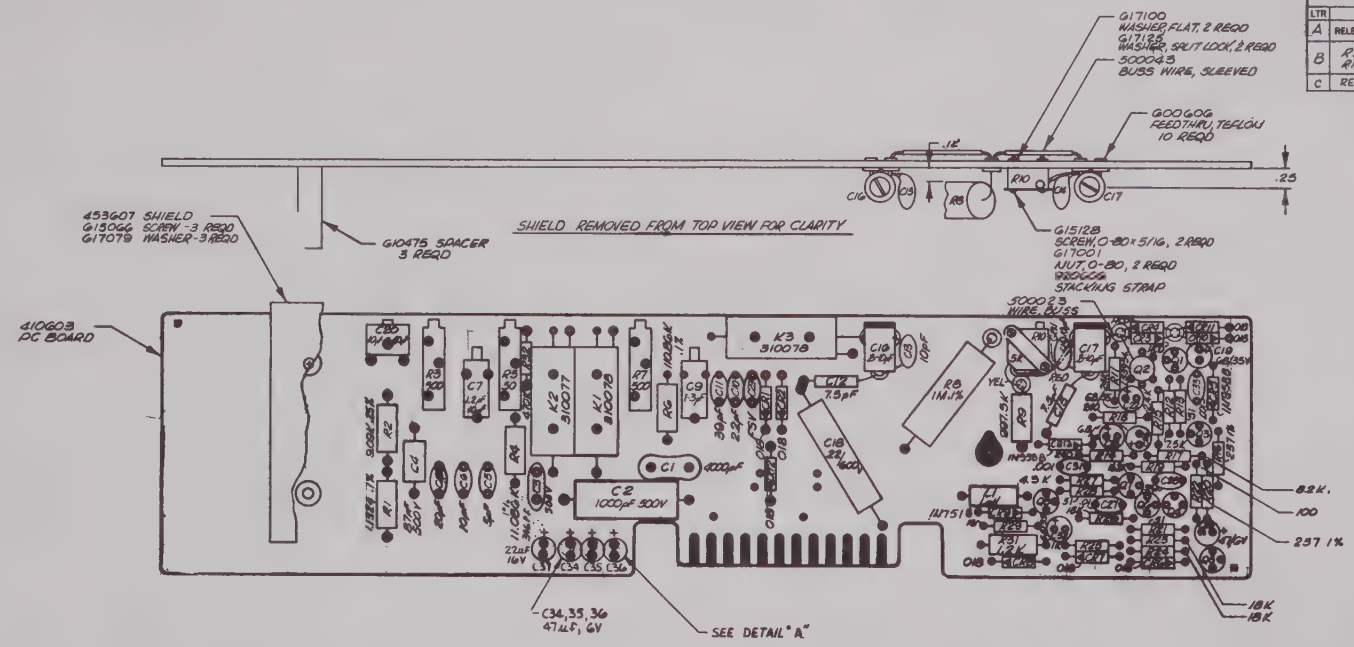
AC CONVERTER ASSEMBLY

SIZE	CODE IDENT NO	DWG NO.	REV
D	21793	403470	C

SCALE 2:1 SHEET 2 OF 7


REVISIONS
LTR DESCRIPTION DR CHK APPD
A RELEASED PER DRN # 997
B C17,C18,C51 WERE .05μF; ADDED VALUE CHANGE NOTE
C REVISED PER E.O. 6449
-18V
+18V
GND 6
GND 3
SCALING OUT
ISOLATOR OUT
GND 1
AC ZERO
AC CONVERTER OUT
GND 7
2. ALL RESISTOR VALUES IN OHMS, 1/4 W, ±5%
1. LAST DESIGNATORS USED R114, CG1, CR14, Q23, AR4
NOTES: UNLESS OTHERWISE SPECIFIED
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING
TOLERANCES
DECIMALS X.030 XX.020 XXX.010
ANGLES 0° 30' FORMED 1° 0'
HOLE DIAMETERS + .004 - .001
DIMENSIONS AND TOLERANCES PER USAS Y14.15
MATERIAL
FINISH
403470 4800
NEXT DWG USED ON
NEXT DWG FINAL ASSY
APPLICATION QTY REQD
DRAWN
CHECK
DESIGN
MECH ENGR
PROJ ENGR
PROD ENGR
DANA DANA LABORATORIES INC. IRVINE, CALIFORNIA
SCHEMATIC CONVERTER
SIZE D
CODE IDENT NO. 21793
DWG NO. 430964
REV C
SCALE
SHEET 1 OF 1

REVISIONS				
LTR	DESCRIPTION	DR	CHK	APPD
A	RELEASED PER DRN # 7797	[illegible]	[illegible]	[illegible]
B	R32 WAS 560K, RELOCATED R1, R2, C3, C4, C5, C6 & C8 6346		[illegible]	[illegible]
C	REVISED PER E.O. 6473	[illegible] 8-22-71		



DETAIL "A"

4. MCD 13 210035 P/N
3. Q1, Q3, Q4, Q5, Q6, Q7 & Q8 ARE SE3005
2. SCHEMATIC REF #430964
1. ASSEMBLY PROCESSES & PROCEDURES TO CONFORM TO DANA WORKMANSHIP STANDARDS

NOTES: UNLESS OTHERWISE SPECIFIED

403440	4800		
NEXT DWG	USED ON	REQ'D PER	TOTAL QUAN
APPLICATION		QTY REQD	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING

TOLERANCES

DECIMALS	ANGLES	HOLE DIAMETERS
X.000 ± .030	0° 30' FORMED	± .004
XX.000 ± .010	1° 0'	- .001
XXX.010		

DIMENSIONS AND TOLERANCES PER USAS Y14.15

MATERIAL | FINISH

DRAWN [illegible] 7/25/71
CHECK [illegible] 7/26/71
ENGR'G [illegible]
MFG'G [illegible]
PROD'N CONTR [illegible] 7/26/71
PROD ENGR [illegible] 7/26/71

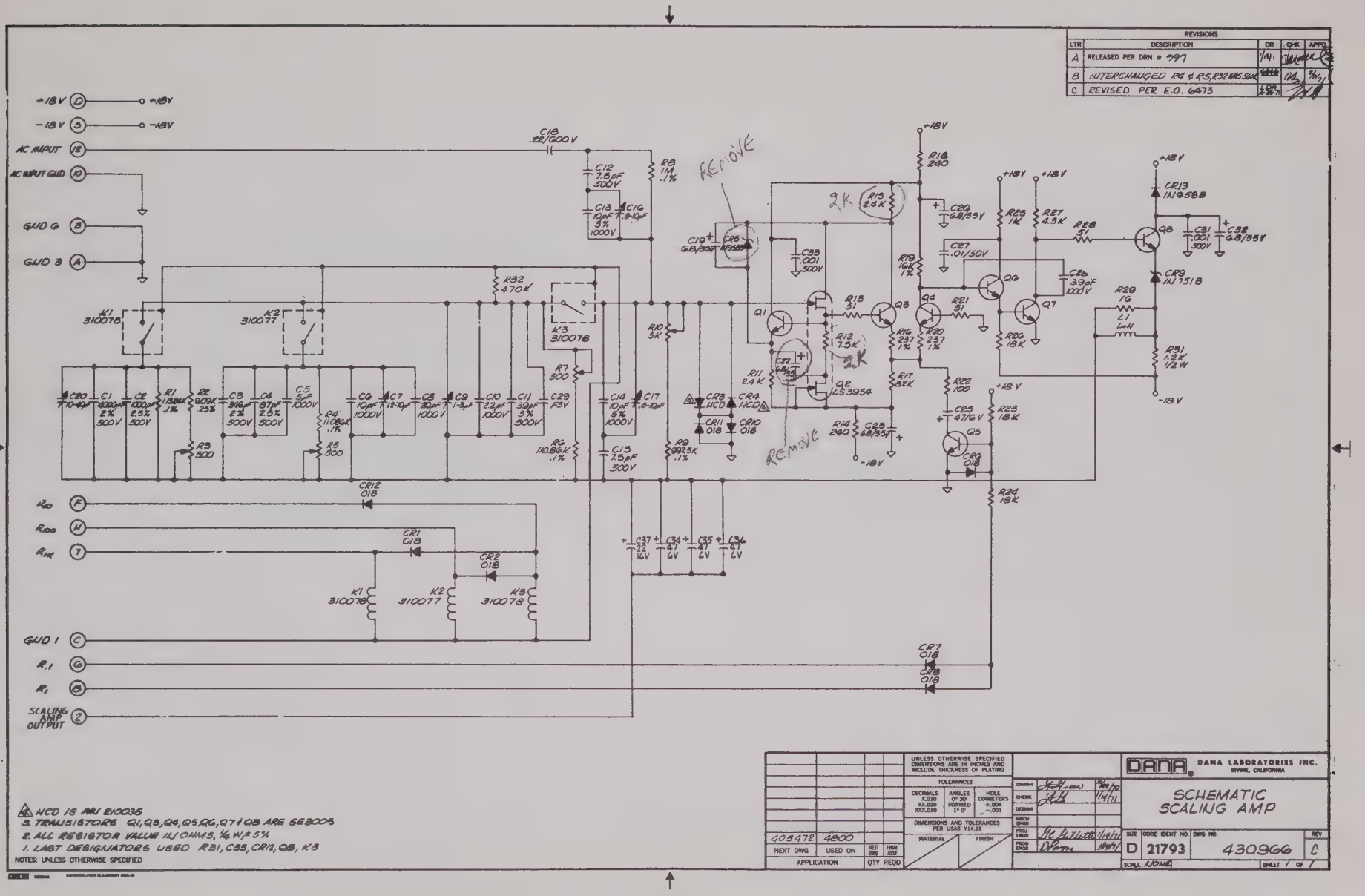
DANA LABORATORIES INC.
IRVINE, CALIFORNIA

SCALING AMP ASSEMBLY

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	403472	C

SCALE 2/1 SHEET 1 OF 2

SHEETS 2 THRU 5 ARE A SER



REVISIONS				
LTR	DESCRIPTION	DR	CHK	APPD
A	RELEASED PER DRN # 397	7/19/71		
B	INTERCHANGED R6 & R5, R32 WAS 520K	9/8/71		
C	REVISED PER E.O. 6473	11/24/71		

⚠ NCD IS AMI 210035
3. TRANSISTORS Q1, Q3, Q4, Q5, Q6, Q7 & Q8 ARE SE3005
2. ALL RESISTOR VALUE IN OHMS, 1/8 W, ± 5%
1. LAST DESIGNATORS USED R31, C33, CR12, Q8, K3
NOTES: UNLESS OTHERWISE SPECIFIED

403472	4800		
NEXT DWG	USED ON	NEXT ASSY	FINAL ASSY
APPLICATION		QTY REQD	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING
TOLERANCES
DECIMALS X.030 XX.020 XXX.010 | ANGLES 0° 30' FORMED 1° 0' | HOLE DIAMETERS +.004 -.001
DIMENSIONS AND TOLERANCES PER USAS Y14.15
MATERIAL | FINISH

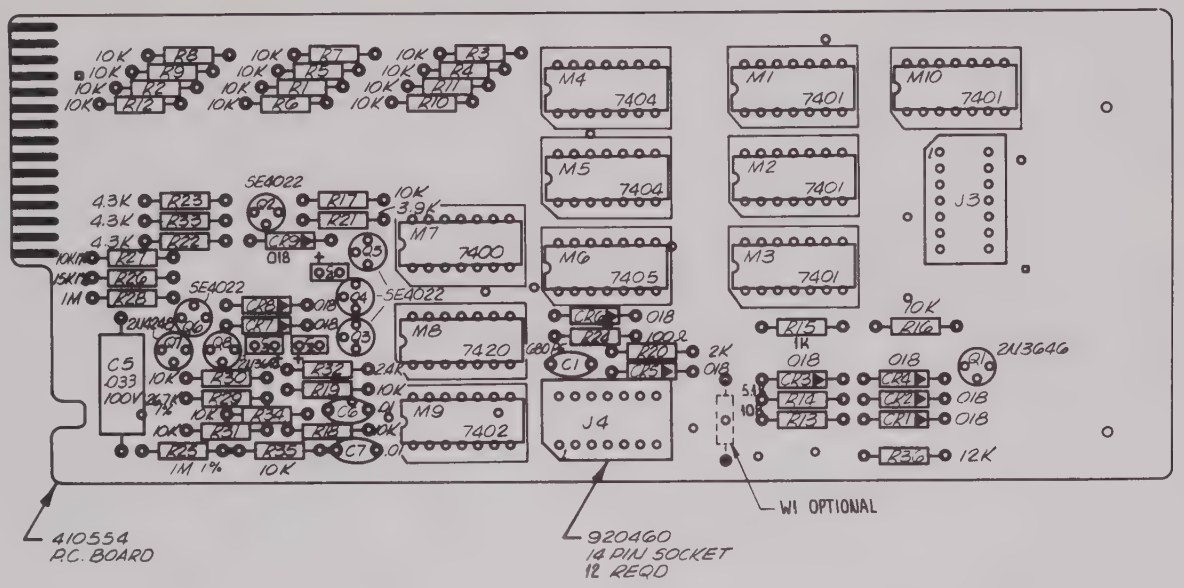
DRAWN	[signature]	10/29/71
CHECK	[signature]	11/4/71
DESIGN		
TECH ENGR		
PROJ ENGR	[signature]	11/4/71
PROD ENGR	[signature]	11/4/71

DANA LABORATORIES INC.
IRVINE, CALIFORNIA

SCHEMATIC SCALING AMP

SIZE	CODE IDENT NO.	DWG NO.	REV
D	21793	430966	C

SCALE NONE | SHEET 1 OF 1



3. C2-.47/50V, C3-.22/50V, C4-.27/50V

2. SCHEMATIC REFERENCE 430959

1. ASSEMBLY PROCESSES AND PROCEDURES TO CONFORM TO DANA WORKMANSHIP STANDARDS

NOTES: UNLESS OTHERWISE SPECIFIED

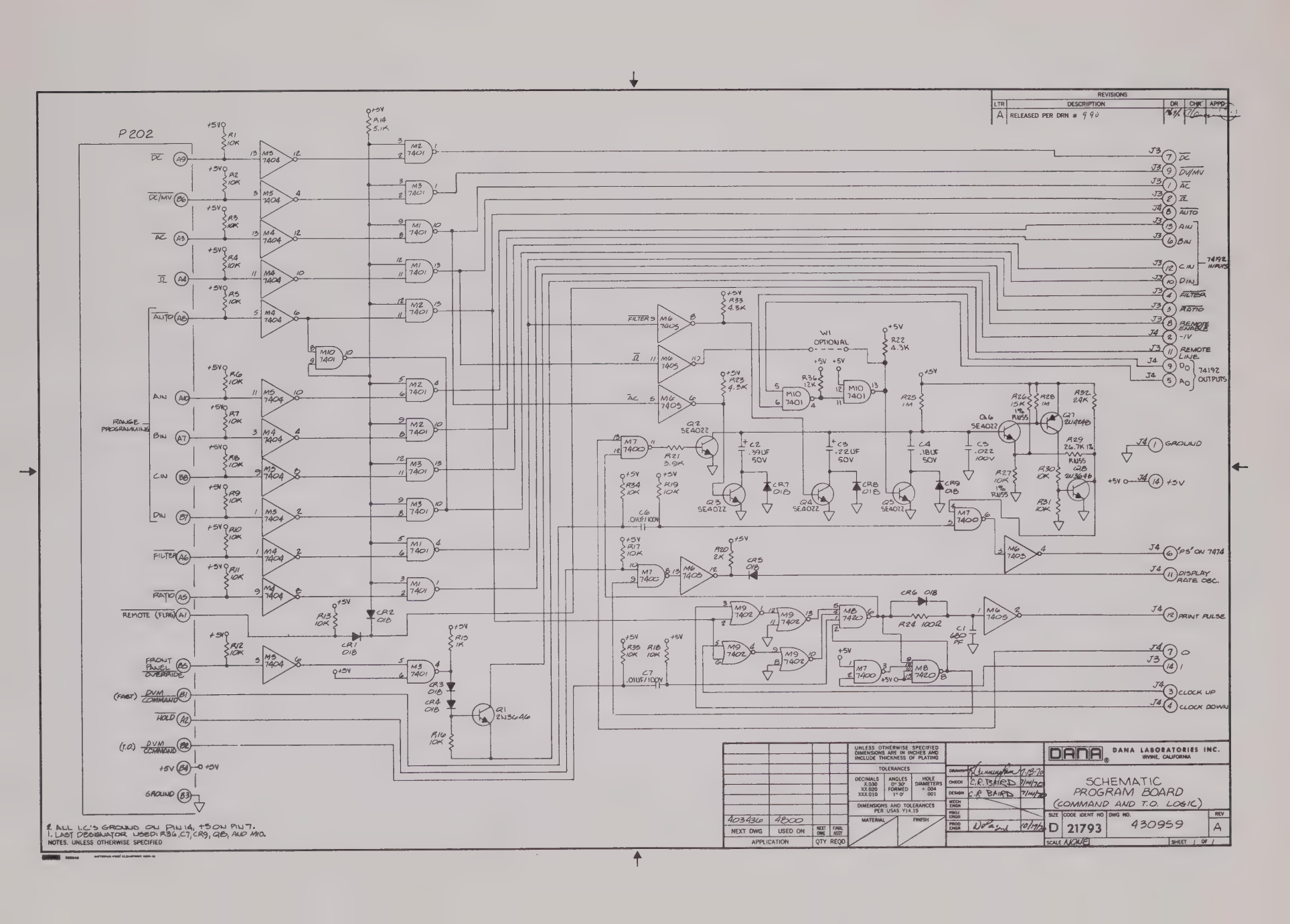
DANA LABORATORIES INC.
IRVINE, CALIFORNIA

ASSEMBLY PROGRAMMING BOARD

SIZE	CODE IDENT NO.	DWG NO.	REV
C	21793	403436	

SCALE 2:1 SHEET 1 OF 3

DATA 26.3 Rev A SIZE


REVISIONS
LTR DESCRIPTION DR CHK APPD
A RELEASED PER DRN # 990
P202
DC
DC/MV
AC
Ω
AUTO
A IN
B IN
C IN
D IN
FILTER
RATIO
REMOTE (FLAG)
FRONT PANEL OVERRIDE
(FAST) DVM COMMAND
HOLD
(T.O.) DVM COMMAND
+5V
GROUND
RANGE PROGRAMMING
W1 OPTIONAL
74192 INPUTS
74192 OUTPUTS
'PS' ON 7474
DISPLAY RATE OSC.
PRINT PULSE
CLOCK UP
CLOCK DOWN
NOTES: UNLESS OTHERWISE SPECIFIED
1. LAST DESIGNATOR USED: R36, C7, CR9, Q6, AND M10.
2. ALL I.C.'S GROUND ON PIN 14, +5V ON PIN 7.
DANA DANA LABORATORIES INC. IRVINE, CALIFORNIA
SCHEMATIC PROGRAM BOARD (COMMAND AND T.O. LOGIC)
SIZE D CODE IDENT NO 21793 DWG NO. 430959 REV A
SCALE NONE SHEET 1 OF 1
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES AND INCLUDE THICKNESS OF PLATING
TOLERANCES
DRAWN K. Cunningham 7-18-70
CHECK C.R. BAIRD 7/14/70
DESIGN C.R. BAIRD 7/14/70
PROJ ENGR
PROD ENGR D. Baird 10/7/70
403436 4800
NEXT DWG USED ON NEXT ASSY FINAL ASSY
APPLICATION QTY REQD

PARTS LIST

ASSEMBLY 403433 - Model 4800

A

REF. DESIG.	PART NO.	DESCRIPTION		
CR01	211083	DIODE SILICO 018	DANA	211083
CR02	211083	DIODE SILICO 018	DANA	211083
CR03	211083	DIODE SILICO 018	DANA	211083
CR04	210021	DIODE	DANA	210021
CR04	920007	TRANSISTOR PAD	M-R	10045
CR05	210021	DIODE	DANA	210021
CR05	920007	TRANSISTOR PAD	M-R	10045
CR06	211083	DIODE SILICO 018	DANA	211083
CR07	211083	DIODE SILICO 018	DANA	211083
CR08	211083	DIODE SILICO 018	DANA	211083
CR09	211083	DIODE SILICO 018	DANA	211083
CR10	211083	DIODE SILICO 018	DANA	211083
CR11	211083	DIODE SILICO 018	DANA	211083
CR12	211083	DIODE SILICO 018	DANA	211083
CR13	211083	DIODE SILICO 018	DANA	211083
CR14	211083	DIODE SILICO 018	DANA	211083
CR15	210004	DIODE SILICO SD4	DIODES IN SD4	
CR16	210004	DIODE SILICO SD4	DIODES IN SD4	
CR17	210004	DIODE SILICO SD4	DIODES IN SD4	
CR18	210004	DIODE SILICO SD4	DIODES IN SD4	
CR19	220015	DIODE SILICO ZENER 1N967B	MOTOROLA	1N967B
CR20	211083	DIODE SILICO 018	DANA	211083
CR21	211083	DIODE SILICO 018	DANA	211083
CR22	220015	DIODE SILICO ZENER 1N967B	MOTOROLA	1N967B
CR23	211083	DIODE SILICO 018	DANA	211083
CR24	220007	DIODE SILICO ZENER 1N751	MOTOROLA	1N751
CR25	210004	DIODE SILICO SD4	DIODES IN SD4	
CR26	210004	DIODE SILICO SD4	DIODES IN SD4	
CR27	210004	DIODE SILICO SD4	DIODES IN SD4	
CR28	210004	DIODE SILICO SD4	DIODES IN SD4	
CR29	210004	DIODE SILICO SD4	DIODES IN SD4	
CR30	210004	DIODE SILICO SD4	DIODES IN SD4	
CR31	210004	DIODE SILICO SD4	DIODES IN SD4	
CR32	220007	DIODE SILICO ZENER 1N751	MOTOROLA	1N751
CR33	211083	DIODE SILICO 018	DANA	211083

PARTS LIST

ASSEMBLY 403433 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION					
CR34	220040	DIODE ZENER				SEMCOR	1N753
CR35	211083	DIODE SILICO	018			DANA	211083
C01	101145	CAP CERAM	10C PFD	500 V	10%	AERCVCX	SCD1X5F
C02	101099	CAP CERAM	68C PFD	500 V	10%	AERCVCX	SCD2X5F
C03	110071	CAP ELECT	.1 MFD	35 V	10%	KEMET	K1W35K
C04	110129	CAP TANTA	.1MF	35V		ITT	4321217010
C05	110129	CAP TANTA	.1MF	35V		ITT	4321217010
C06	110067	CAP ELECT	2000 MFD	35 V	20%	DUCATI	2000-35
C07	110067	CAP ELECT	200C MFD	35 V	20%	DUCATI	2000-35
C08	110036	CAP ELECT	25 MFD	50 V	20%	DUCATI	25-50
C09	110036	CAP ELECT	25 MFD	50 V	20%	DUCATI	25-50
C10	110036	CAP ELECT	25 MFD	50 V	20%	DUCATI	25-50
C11	110036	CAP ELECT	25 MFD	50 V	20%	DUCATI	25-50
C18	110069	CAP ELEC	10 MFD	10 V		KEMET	K10W10K
C19	110127	CAP TANT	22 MFD	6.3 V		ITT	43212 12222
C20	101642	CAP CERAM	150 PFD	500 V	10%	AERCVCX	SCD2X5F
C21	100012	CAP CERAM	33 PFD	500 V	10%	AERCVCX	TCD-N750
C22	100008	CAP CERAM	82 PFD	500 V	10%	AERCVCX	TCD-N750
C23	110128	CAP	600C MFD	10 V		SPRGUE36D	602G010AA2A
C24	110127	CAP TANT	22 MFD	6.3 V		ITT	43212 12222
C25	110127	CAP TANT	22 MFD	6.3 V		ITT	43212 12222
J01	453505	CONN 12 P				CINCH	252-12-30-160
J02	600280	CONN 12 P				CINCH	252-12-30-
J03	920460	INTEGRATED CIRCUIT				AUGAT	314AG5D-2R
J04	920460	INTEGRATED CIRCUIT				AUGAT	314AG5D-2R
J05	600228	CONN 18 P				CINCH	252-18-30-160
J06	600671	CONN				CINCH	50-12B-10
J07	600280	CONN 12 P				CINCH	252-12-30-
J08	600670	CONN 10 P				CINCH	50-20B-10
J09	600280	CONN 12 P				CINCH	252-12-30-
J10	600280	CONN 12 P				CINCH	252-12-30-
J11	600280	CONN 12 P				CINCH	252-12-30-
J12	600280	CONN 12 P				CINCH	252-12-30-
K01	310063	RELAY	150 OHM			P & B	R10E1221-1
K02	310063	RELAY	150 OHM			P & B	R10E1221-1

PARTS LIST

ASSEMBLY 403433 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION			
K03	310063	RELAY	150 OHM	P & B	R10E1221-1
K04	310076	RELAY	28 V	P & B	R10E-1297-2
L01	310062	CHOKE	22 UH	DELEVAN	1537-44
M01	230034	INTEGRATED CIRCUIT		TI	SN7441N
M01	920419	INTEGRATED CIRCUIT	SOCKET - 16 PIN	AUGAT	316AG5D-2R
M02	230034	INTEGRATED CIRCUIT		TI	SN7441N
M03	230034	INTEGRATED CIRCUIT		TI	SN7441N
M04	230034	INTEGRATED CIRCUIT		TI	SN7441N
M04	920419	INTEGRATED CIRCUIT	SOCKET - 16 PIN	AUGAT	316AG5D-2R
M05	230038	INTEGRATED CIRCUIT		TI	SN74H11N
M05	920460	INTEGRATED CIRCUIT		AUGAT	314AG5D-2R
M06	230028	INTEGRATED CIRCUIT		TI	SN7400N
M06	920460	INTEGRATED CIRCUIT		AUGAT	314AG5D-2R
M07	230065	INTEGRATED CIRCUIT		TI	SN7475N
M07	920419	INTEGRATED CIRCUIT	SOCKET - 16 PIN	AUGAT	316AG5D-2R
M08	230065	INTEGRATED CIRCUIT		TI	SN7475N
M09	230065	INTEGRATED CIRCUIT		TI	SN7475N
M10	230065	INTEGRATED CIRCUIT		TI	SN7475N
M10	920419	INTEGRATED CIRCUIT	SOCKET - 16 PIN	AUGAT	316AG5D-2R
M11	230030	INTEGRATED CIRCUIT		TI	SN7402N
M11	920460	INTEGRATED CIRCUIT		AUGAT	314AG5D-2R
M12	230035	INTEGRATED CIRCUIT		TI	SN7473N
M13	230037	INTEGRATED CIRCUIT		TI	SN7490N
M14	230037	INTEGRATED CIRCUIT		TI	SN7490N
M15	230037	INTEGRATED CIRCUIT		TI	SN7490N
M16	230037	INTEGRATED CIRCUIT		TI	SN7490N
M17	230028	INTEGRATED CIRCUIT		TI	SN7400N
M18	230030	INTEGRATED CIRCUIT		TI	SN7402N
M19	230072	INTEGRATED CIRCUIT		TI	SN7474N
M20	230035	INTEGRATED CIRCUIT		TI	SN7473N
M21	230028	INTEGRATED CIRCUIT		TI	SN7400N
M22	230063	INTEGRATED CIRCUIT		TI	SN7440N
M23	230029	INTEGRATED CIRCUIT		TI	SN7401N
M24	230064	INTEGRATED CIRCUIT		TI	SN7404N
M25	230030	INTEGRATED CIRCUIT		TI	SN7402N

PARTS LIST

ASSEMBLY 403433 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION			
M26	230072	INTEGRATED CIRCUIT		TI	SN7474N
M27	230031	INTEGRATED CIRCUIT		TI	SN7410N
M28	230064	INTEGRATED CIRCUIT		TI	SN7404N
M28	920460	INTEGRATED CIRCUIT		AUGAT	314AG5D-2R
M29	230036	INTEGRATED CIRCUIT		TI	SN7483N
M29	920419	INTEGRATED CIRCUIT	SOCKET - 16 PIN	AUGAT	316AG5D-2R
M30	230067	INTEGRATED CIRCUIT		TI	SN74192
M31	230036	INTEGRATED CIRCUIT		TI	SN7483N
M31	920419	INTEGRATED CIRCUIT	SOCKET - 16 PIN	AUGAT	316AG5D-2R
M32	230028	INTEGRATED CIRCUIT		TI	SN7400N
M32	920460	INTEGRATED CIRCUIT		AUGAT	314AG5D-2R
Q01	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q02	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q03	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q04	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q05	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q06	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q07	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q08	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q09	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q10	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q11	200088	TRANS SILICO PNP	2N4248	FAIRCHILD	2N4248
Q12	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q13	200088	TRANS SILICO PNP	2N4248	FAIRCHILD	2N4248
Q14	200129	TRANS		FAIRCHILD	SE4020
Q15	200132	TRANS		FAIRCHILD	FPT100
Q16	200132	TRANS		FAIRCHILD	FPT100
Q17	200129	TRANS		FAIRCHILD	SE4020
Q18	200088	TRANS SILICO PNP	2N4248	FAIRCHILD	2N4248
Q19	200043	TRANS SILICO NPN	2N3565	FAIRCHILD	2N3565
Q20	200043	TRANS SILICO NPN	2N3565	FAIRCHILD	2N3565
Q21	200088	TRANS SILICO PNP	2N4248	FAIRCHILD	2N4248
Q22	200043	TRANS SILICO NPN	2N3565	FAIRCHILD	2N3565
Q23	200154	TRANS		MOTOROLA	MJE370
Q24	200088	TRANS SILICO PNP	2N4248	FAIRCHILD	2N4248

PARTS LIST

ASSEMBLY 403433 - Model 4800

A

REF. DESIG.	PART NO.	DESCRIPTION							
Q25	200155	TRANS						MOTOROLA	MJE520
Q26	200075	TRANS			2N4870			MOTOROLA	2N4870
Q27	200037	TRANS	SILICO	NPN	2N3646			FAIRCHILD	2N3646
Q28	200037	TRANS	SILICO	NPN	2N3646			FAIRCHILD	2N3646
Q29	200088	TRANS	SILICO	PNP	2N4248			FAIRCHILD	2N4248
Q30	200043	TRANS	SILICO	NPN	2N3565			FAIRCHILD	2N3565
Q31	200052	TRANS	SILICO	PNP	009			DANA	200052
R01	001681	RES	CARBON	7.5 K		5%	1/2 W	OHMITE	RC20GF752J
R02	001681	RES	CARBON	7.5 K		5%	1/2 W	OHMITE	RC20GF752J
R03	000750	RES	CARBON	75	OHM	5%	1/4 W	OHMITE	RC07GF750J
R04	000750	RES	CARBON	75	OHM	5%	1/4 W	OHMITE	RC07GF750J
R05	000103	RES	CARBON	10 K		5%	1/4 W	OHMITE	RC07GF103J
R06	001681	RES	CARBON	7.5 K		5%	1/2 W	OHMITE	RC20GF752J
R07	000103	RES	CARBON	10 K		5%	1/4 W	OHMITE	RC07GF103J
R08	000432	RES	CARBON	4.3 K		5%	1/4 W	OHMITE	RC07GF432J
R09	001681	RES	CARBON	7.5 K		5%	1/2 W	OHMITE	RC20GF752J
R10	000512	RES	CARBON	5.1 K		5%	1/4 W	OHMITE	RC07GF512J
R11	000103	RES	CARBON	10 K		5%	1/4 W	OHMITE	RC07GF103J
R12	001681	RES	CARBON	7.5 K		5%	1/2 W	OHMITE	RC20GF752J
R13	000103	RES	CARBON	10 K		5%	1/4 W	OHMITE	RC07GF103J
R14	000103	RES	CARBON	10 K		5%	1/4 W	OHMITE	RC07GF103J
R15	000102	RES	CARBON	1 K		5%	1/4 W	OHMITE	RC07GF102J
R16	000103	RES	CARBON	10 K		5%	1/4 W	OHMITE	RC07GF103J
R17	000432	RES	CARBON	4.3 K		5%	1/4 W	OHMITE	RC07GF432J
R18	000822	RES	CARBON	8.2 K		5%	1/4 W	OHMITE	RC07GF822J
R19	000512	RES	CARBON	5.1 K		5%	1/4 W	OHMITE	RC07GF512J
R20	000103	RES	CARBON	10 K		5%	1/4 W	OHMITE	RC07GF103J
R21	000201	RES	CARBON	200	OHM	5%	1/4 W	OHMITE	RC07GF201J
R22	000201	RES	CARBON	200	OHM	5%	1/4 W	OHMITE	RC07GF201J
R23	000101	RES	CARBON	100	OHM	5%	1/4 W	OHMITE	RC07GF101J
R24	000102	RES	CARBON	1 K		5%	1/4 W	OHMITE	RC07GF102J
R25	000102	RES	CARBON	1 K		5%	1/4 W	OHMITE	RC07GF102J
R26	000103	RES	CARBON	10 K		5%	1/4 W	OHMITE	RC07GF103J
R27	000200	RES	CARBON	20	OHM	5%	1/4 W	OHMITE	RC07GF200J
R28	000103	RES	CARBON	10 K		5%	1/4 W	OHMITE	RC07GF103J

ASSEMBLY 403433 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
R29	000200	RES	CARBON	20	OHM	5%	1/4 W	CHMITE	RC07GF200J
R30	030015	RES	WW	100	K	1%	10 W	C-F	M-100
R31	000203	RES	CARBON	20	K	5%	1/4 W	CHMITE	RC07GF203J
R32	010334	RES		SET				DANA	010334
R33	040187	POT	CERMET	500	OHM	20%		CTS	360T501B
R34	010334	RES		SET				DANA	010334
R35	000203	RES	CARBON	20	K	5%	1/4 W	CHMITE	RC07GF203J
R36	000182	RES	CARBON	1.8	K	5%	1/4 W	CHMITE	RC07GF182J
R37	040187	POT	CERMET	500	OHM	20%		CTS	360T501B
R38	010607	RES	METAL	17.999	K	.05%		VISHAY	V53-1
R39	001721	RES	CARBON	2.2	OHM	5%	1/2 W	CHMITE	RC20GF02CJ
R40	010608	RES	METAL	1798.9	OHM	.05%		VISHAY	V53-1
R41	010658	RES		199.8	OHM	.05%		VISHAY	V53-1
R42	000106	RES	CARBON	10	M	5%	1/4 W	CHMITE	RC07GF106J
R43	000106	RES	CARBON	10	M	5%	1/4 W	CHMITE	RC07GF106J
R44	040113	RES	VARI	100	K	10%		BECKMAN	79P100K
R45	010645	RES	METAL			1%	T-0	IRC	RN55D2371F
R46	000516	RES	CARBON	51	M	5%	1/4 W	CHMITE	RC07GF516J
R47	040113	RES	VARI	100	K	10%		BECKMAN	79P100K
R48	000332	RES	CARBON	3.3	K	5%	1/4 W	CHMITE	RC07GF332J
R49	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R50	000512	RES	CARBON	5.1	K	5%	1/4 W	CHMITE	RC07GF512J
R51	000122	RES	CARBON	1.2	K	5%	1/4 W	CHMITE	RC07GF122J
R52	000122	RES	CARBON	1.2	K	5%	1/4 W	CHMITE	RC07GF122J
R53	000183	RES	CARBON	18	K	5%	1/4 W	CHMITE	RC07GF183J
R54	001738	RES	CARBON	1.5	OHM	5%	1/2 W	CHMITE	RC20GF010J
R55	001738	RES	CARBON	1.5	OHM	5%	1/2 W	CHMITE	RC20GF010J
R56	001737	RES	FSV			5%	1/4 W	DANA	001737
R57	000151	RES	CARBON	150	OHM	5%	1/4 W	CHMITE	RC07GF151J
R58	000102	RES	CARBON	1	K	5%	1/4 W	CHMITE	RC07GF102J
R59	000102	RES	CARBON	1	K	5%	1/4 W	CHMITE	RC07GF102J
R60	000391	RES	CARBON	390	OHM	5%	1/4 W	CHMITE	RC07GF391J
R61	000121	RES	CARBON	120	OHM	5%	1/4 W	CHMITE	RC07GF121J
R62	000102	RES	CARBON	1	K	5%	1/4 W	CHMITE	RC07GF102J
R63	000102	RES	CARBON	1	K	5%	1/4 W	CHMITE	RC07GF102J

PARTS LIST

ASSEMBLY 403433 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION								
R64	000511	RES	CARBON	510	OHM	5%	1/4 W		OHMITE	RC07GF511J
R65	000102	RES	CARBON	1	K	5%	1/4 W		OHMITE	RC07GF102J
R66	000202	RES	CARBON	2	K	5%	1/4 W		OHMITE	RC07GF202J
R67	020576	RES	WW	.24	OHM		5%	2W		
R68	040188	POT	CERMET	100	K	20%			CTS	360T104B
R69	010645	RES	METAL			1%	T-0		IRC	RN55D2371F
R70	000103	RES	CARBON	10	K	5%	1/4 W		OHMITE	RC07GF103J
R71	040113	RES	VARI	100	K	10%			BECKMAN	79P100K
S01	600684	SWITCH PUSHBUTTON							DANA	600684
S02	600684	SWITCH PUSHBUTTON							DANA	600684
S03	600682	SWITCH PUSHBUTTON							DANA	600682
S04	600682	SWITCH PUSHBUTTON							DANA	600682
S05	600683	SWITCH PUSHBUTTON							DANA	600683
S06	600683	SWITCH PUSHBUTTON							DANA	600683
TP01	600591	POST, TEST POINT							AMP	85931-6
TP07	600591	POST, TEST POINT							AMP	85931-6
T01	300057	TRANSFORMER							DANA	300057
T02	300057	TRANSFORMER							DANA	300057
T03	300057	TRANSFORMER							DANA	300057
V01	920466	TUBE, READOUT							AMPEREX	ZM1005
V02	920466	TUBE, READOUT							AMPEREX	ZM1005
V03	920466	TUBE, READOUT							AMPEREX	ZM1005
V04	920466	TUBE, READOUT							AMPEREX	ZM1005
V05	920466	TUBE, READOUT							AMPEREX	ZM1005
W01	600245	JUMPER							GETTIG	L-2007-1

PARTS LIST

ASSEMBLY 403430 - Model 4800

A

REF. DESIG.	PART NO.	DESCRIPTION			
CR01	211083	DIODE SILICO	018	DANA	211083
CR02	211083	DIODE SILICO	018	DANA	211083
CR03	211083	DIODE SILICO	018	DANA	211083
CR04	211083	DIODE SILICO	018	DANA	211083
CR05	211083	DIODE SILICO	018	DANA	211083
CR06	211083	DIODE SILICO	018	DANA	211083
CR07	211083	DIODE SILICO	018	DANA	211083
CR08	211083	DIODE SILICO	018	DANA	211083
CR09	211083	DIODE SILICO	018	DANA	211083
CR10	211083	DIODE SILICO	018	DANA	211083
CR11	210004	DIODE SILICO	SD4	DIODES IN SD4	
CR12	211083	DIODE SILICO	018	DANA	211083
CR13	210004	DIODE SILICO	SD4	DIODES IN SD4	
CR14	210004	DIODE SILICO	SD4	DIODES IN SD4	
CR15	210004	DIODE SILICO	SD4	DIODES IN SD4	
CR16	211083	DIODE SILICO	018	DANA	211083
CR17	211083	DIODE SILICO	018	DANA	211083
CR18	211083	DIODE SILICO	018	DANA	211083
CR19	211083	DIODE SILICO	018	DANA	211083
CR20	220059	DIODE ZENER			
CR22	211083	DIODE SILICO	018	DANA	211083
CR23	211083	DIODE SILICO	018	DANA	211083
CR24	211083	DIODE SILICO	018	DANA	211083
CR25	211083	DIODE SILICO	018	DANA	211083
CR26	211083	DIODE SILICO	018	DANA	211083
CR27	211083	DIODE SILICO	018	DANA	211083
CR28	211083	DIODE SILICO	018	DANA	211083
CR29	211083	DIODE SILICO	018	DANA	211083
CR30	211083	DIODE SILICO	018	DANA	211083
CR31	211083	DIODE SILICO	018	DANA	211083
CR32	211083	DIODE SILICO	018	DANA	211083
CR33	211083	DIODE SILICO	018	DANA	211083
CR34	211083	DIODE SILICO	018	DANA	211083
CR35	211083	DIODE SILICO	018	DANA	211083
CR36	211083	DIODE SILICO	018	DANA	211083

PARTS LIST

ASSEMBLY 403430 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION			
CR37	211083	DIODE SILICO	018	DANA	211083
CR38	211083	DIODE SILICO	018	DANA	211083
CR39	211083	DIODE SILICO	018	DANA	211083
CR40	211083	DIODE SILICO	018	DANA	211083
CR41	211083	DIODE SILICO	018	DANA	211083
CR42	211083	DIODE SILICO	018	DANA	211083
CR43	211083	DIODE SILICO	018	DANA	211083
CR44	211083	DIODE SILICO	018	DANA	211083
CR45	211083	DIODE SILICO	018	DANA	211083
CR46	211083	DIODE SILICO	018	DANA	211083
CR47	211083	DIODE SILICO	018	DANA	211083
CR48	211083	DIODE SILICO	018	DANA	211083
CR49	211083	DIODE SILICO	018	DANA	211083
C01	120230	CAP POLY	.015 MFD 33 V 1%	NPC	
M01	230034	INTEGRATED CIRCUIT		TI	SN7441N
M02	230072	INTEGRATED CIRCUIT		TI	SN7474N
M03	230035	INTEGRATED CIRCUIT		TI	SN7473N
M04	230030	INTEGRATED CIRCUIT		TI	SN7402N
M04	230074	INTEGRATED CIRCUIT		IRC	SN7442N
M05	230028	INTEGRATED CIRCUIT		TI	SN7400N
M06	230030	INTEGRATED CIRCUIT		TI	SN7402N
M07	230029	INTEGRATED CIRCUIT		TI	SN7401N
M07	230030	INTEGRATED CIRCUIT		TI	SN7402N
M08	230030	INTEGRATED CIRCUIT		TI	SN7402N
M09	230029	INTEGRATED CIRCUIT		TI	SN7401N
M10	230073	INTEGRATED CIRCUIT		LIBERTY	SN7405N
Q01	200087	TRANS SILICO	021	MOTOROLA	SPS1226
Q02	200087	TRANS SILICO	021	MOTOROLA	SPS1226
Q03	200087	TRANS SILICO	021	MOTOROLA	SPS1226
Q04	200087	TRANS SILICO	021	MOTOROLA	SPS1226
Q05	200087	TRANS SILICO	021	MOTOROLA	SPS1226
Q06	200087	TRANS SILICO	021	MOTOROLA	SPS1226
Q07	200087	TRANS SILICO	021	MOTOROLA	SPS1226
Q08	200087	TRANS SILICO	021	MOTOROLA	SPS1226
Q09	200087	TRANS SILICO	021	MOTOROLA	SPS1226

PARTS LIST

ASSEMBLY 403430 - Model 4800

A

REF. DESIG.	PART NO.	DESCRIPTION						
Q10	200087	TRANS SILICO		021			MOTOROLA	SPS1226
Q11	200087	TRANS SILICO		021			MOTOROLA	SPS1226
Q12	200037	TRANS SILICO	NPN	2N3646			FAIRCHILD	2N3646
Q13	200037	TRANS SILICO	NPN	2N3646			FAIRCHILD	2N3646
Q14	200087	TRANS SILICO		021			MOTOROLA	SPS1226
R01	000514	RES	CARBON	510 K	5%	1/4 W	OHMITE	RC07GF524J
R02	000433	RES	CARBON	43 K	5%	1/4 W	OHMITE	RC07GF433J
R03	000433	RES	CARBON	43 K	5%	1/4 W	OHMITE	RC07GF433J
R04	000514	RES	CARBON	510 K	5%	1/4 W	OHMITE	RC07GF524J
R05	000433	RES	CARBON	43 K	5%	1/4 W	OHMITE	RC07GF433J
R06	000514	RES	CARBON	510 K	5%	1/4 W	OHMITE	RC07GF524J
R07	000433	RES	CARBON	43 K	5%	1/4 W	OHMITE	RC07GF433J
R08	000433	RES	CARBON	43 K	5%	1/4 W	OHMITE	RC07GF433J
R09	000433	RES	CARBON	43 K	5%	1/4 W	OHMITE	RC07GF433J
R10	000433	RES	CARBON	43 K	5%	1/4 W	OHMITE	RC07GF433J
R11	000433	RES	CARBON	43 K	5%	1/4 W	OHMITE	RC07GF433J
R12	000433	RES	CARBON	43 K	5%	1/4 W	OHMITE	RC07GF433J
R13	000512	RES	CARBON	5.1 K	5%	1/4 W	OHMITE	RC07GF512J
R14	000512	RES	CARBON	5.1 K	5%	1/4 W	OHMITE	RC07GF512J
R15	000512	RES	CARBON	5.1 K	5%	1/4 W	OHMITE	RC07GF512J
R16	000512	RES	CARBON	5.1 K	5%	1/4 W	OHMITE	RC07GF512J
R17	000512	RES	CARBON	5.1 K	5%	1/4 W	OHMITE	RC07GF512J
R18	000433	RES	CARBON	43 K	5%	1/4 W	OHMITE	RC07GF433J
R19	000302	RES	CARBON	3 K	5%	1/4 W	OHMITE	RC07GF302J
R20	000432	RES	CARBON	4.3 K	5%	1/4 W	OHMITE	RC07GF432J
R21	000432	RES	CARBON	4.3 K	5%	1/4 W	OHMITE	RC07GF432J
R22	000302	RES	CARBON	3 K	5%	1/4 W	OHMITE	RC07GF302J
R23	000512	RES	CARBON	5.1 K	5%	1/4 W	OHMITE	RC07GF512J
R24	000432	RES	CARBON	4.3 K	5%	1/4 W	OHMITE	RC07GF432J
R25	000432	RES	CARBON	4.3 K	5%	1/4 W	OHMITE	RC07GF432J
R26	000432	RES	CARBON	4.3 K	5%	1/4 W	OHMITE	RC07GF432J
R27	000103	RES	CARBON	10 K	5%	1/4 W	OHMITE	RC07GF103J
R28	000103	RES	CARBON	10 K	5%	1/4 W	OHMITE	RC07GF103J
R29	000103	RES	CARBON	10 K	5%	1/4 W	OHMITE	RC07GF103J
R30	000103	RES	CARBON	10 K	5%	1/4 W	OHMITE	RC07GF103J

PARTS LIST

ASSEMBLY 403430 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
R31	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R32	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R33	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R34	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R35	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R36	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R37	000102	RES	CARBON	1 K	5%	1/4 W		CHMITE	RC07GF102J
R38	000242	RES	CARBON	2.4 K	5%	1/4 W		CHMITE	RC07GF242J
R39	010568	RES	METAL	1.54 K	.25%	(T-2)		IRC	RN55C
R40	000242	RES	CARBON	2.4 K	5%	1/4 W		CHMITE	RC07GF242J
R41	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R42	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R43	000512	RES	CARBON	5.1 K	5%	1/4 W		CHMITE	RC07GF512J
R44	000102	RES	CARBON	1 K	5%	1/4 W		CHMITE	RC07GF102J
R45	000102	RES	CARBON	1 K	5%	1/4 W		CHMITE	RC07GF102J
R46	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R47	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R48	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
R49	000102	RES	CARBON	1 K	5%	1/4 W		CHMITE	RC07GF102J
R50	000102	RES	CARBON	1 K	5%	1/4 W		CHMITE	RC07GF102J
R51	000621	RES	CARBON	620 OHM	5%	1/4 W		CHMITE	RC07GF621J
R52	000103	RES	CARBON	10 K	5%	1/4 W		CHMITE	RC07GF103J
S01	600675	SWITCH, ROTARY						DANA	600675
S02	600674	SWITCH, ROTARY						DANA	600674
W01	600245	JUMPER						GETTIG	L-2007-1
W02	600245	JUMPER						GETTIG	L-2007-1
W03	600245	JUMPER						GETTIG	L-2007-1

PARTS LIST

ASSEMBLY 403432 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION	
AR01	230054	INTEGRATED CIRCUIT LM301A	NAT SEMI LM301A
AR02	230054	INTEGRATED CIRCUIT LM301A	NAT SEMI LM301A
AR03	230054	INTEGRATED CIRCUIT LM301A	NAT SEMI LM301A
AR04	230054	INTEGRATED CIRCUIT LM301A	NAT SEMI LM301A
AR05	230056	INTEGRATED CIRCUIT UA710C	FAIRCHILD U6A7710393
CR01	211083	DIODE SILICO 018	DANA 211083
CR02	211083	DIODE SILICO 018	DANA 211083
CR03	211083	DIODE SILICO 018	DANA 211083
CR04	211083	DIODE SILICO 018	DANA 211083
CR05	211083	DIODE SILICO 018	DANA 211083
CR06	220026	DIODE ZENER	MOTOROLA 1N963B
CR07	211083	DIODE SILICO 018	DANA 211083
CR08	220054	DIODE ZENER	MOTOROLA 1N5260B
CR09	211236	DIODE SILICO 007	DANA 211236
CR10	403423	ASSEMBLY, ZENER	DANA 403423
CR11	211236	DIODE SILICO 007	DANA 211236
CR12	211236	DIODE SILICO 007	DANA 211236
CR13	211083	DIODE SILICO 018	DANA 211083
CR14	211083	DIODE SILICO 018	DANA 211083
CR15	211083	DIODE SILICO 018	DANA 211083
CR16	211083	DIODE SILICO 018	DANA 211083
CR17	211083	DIODE SILICO 018	DANA 211083
CR18	211083	DIODE SILICO 018	DANA 211083
CR19	220026	DIODE ZENER	MOTOROLA 1N963B
CR20	220027	DIODE SILICO ZENER 1N749A	MOTOROLA 1N749A
CR21	220059	DIODE ZENER	
CR22	220007	DIODE SILICO ZENER 1N751	MOTOROLA 1N751
C01	110125	CAP TANT 2.2 MFD 35 V	ITT 43212 17122
C02	110125	CAP TANT 2.2 MFD 35 V	ITT 43212 17122
C03	101098	CAP CERAM 330 PFD 500 V 10%	AERCVCX SCD1X5F
C04	101145	CAP CERAM 100 PFD 500 V 10%	AERCVCX SCD1X5F
C05	101145	CAP CERAM 100 PFD 500 V 10%	AERCVCX SCD1X5F
C06	120253	CAP .33 MFD 100 V 1%	TRW 863UW
C07	110125	CAP TANT 2.2 MFD 35 V	ITT 43212 17122
C08	101642	CAP CERAM 150 PFD 500 V 10%	AERCVCX SCD2X5F

PARTS LIST

ASSEMBLY 403432 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION					
C09	101642	CAP	CERAM	150 PFD 500 V	10%	AERCVCX	SCD2X5F
C10	101642	CAP	CERAM	150 PFD 500 V	10%	AERCVCX	SCD2X5F
C11	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C12	100012	CAP	CERAM	33 PFD 500 V	10%	AERCVCX	TCD-N750
C13	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C14	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C15	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C17	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C18	100012	CAP	CERAM	33 PFD 500 V	10%	AERCVCX	TCD-N750
C19	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C20	100038	CAP	CERAM	560 PFD 500 V	5%	AEROVOX	TCD-N 750
C21	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C22	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C23	100012	CAP	CERAM	33 PFD 500 V	10%	AERCVCX	TCD-N750
C24	110127	CAP	TANT	22 MFD 6.3 V		ITT	43212 12222
C25	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C26	110129	CAP	TANTA	.1MF 35V		ITT	4321217010
C27	110127	CAP	TANT	22 MFD 6.3 V		ITT	43212 12222
C28	110126	CAP	TANTA			ITT	4312 17168
C30	100051	CAP		3 PF		TCD	B1-0
C31	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
M01	230028	INTEGRATED CIRCUIT				TI	SN7400N
M02	230028	INTEGRATED CIRCUIT				TI	SN7400N
Q01	200037	TRANS SILICO NPN		2N3646		FAIRCHILD	2N3646
Q02	200037	TRANS SILICO NPN		2N3646		FAIRCHILD	2N3646
Q03	200037	TRANS SILICO NPN		2N3646		FAIRCHILD	2N3646
Q04	200037	TRANS SILICO NPN		2N3646		FAIRCHILD	2N3646
Q05	200088	TRANS SILICO PNP		2N4248		FAIRCHILD	2N4248
Q06	200088	TRANS SILICO PNP		2N4248		FAIRCHILD	2N4248
Q07	200088	TRANS SILICO PNP		2N4248		FAIRCHILD	2N4248
Q08	200088	TRANS SILICO PNP		2N4248		FAIRCHILD	2N4248
Q09	200088	TRANS SILICO PNP		2N4248		FAIRCHILD	2N4248
Q10	200088	TRANS SILICO PNP		2N4248		FAIRCHILD	2N4248
Q11	200088	TRANS SILICO PNP		2N4248		FAIRCHILD	2N4248
Q12	200043	TRANS SILICO NPN		2N3565		FAIRCHILD	2N3565

PARTS LIST

ASSEMBLY 403432 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION
Q13	20C162	SWITCHES FET MATCHED SET LEDEL
Q14	2CC129	TRANS FAIRCHILD SE4020
Q15	20C162	SWITCHES FET MATCHED SET LEDEL
Q16	20C129	TRANS FAIRCHILD SE4020
Q17	20C162	SWITCHES FET MATCHED SET LEDEL
Q18	200129	TRANS FAIRCHILD SE4020
Q19	200088	TRANS SILICO PNP 2N4248 FAIRCHILD 2N4248
Q20	2CC160	FET LEDEL LS4416
Q21	20C161	DUAL FET LEDEL LS3954
Q22	200088	TRANS SILICO PNP 2N4248 FAIRCHILD 2N4248
Q24	20CC35	TRANS SILICO NPN 014 DANA 200035
Q25	200088	TRANS SILICO PNP 2N4248 FAIRCHILD 2N4248
Q26	200037	TRANS SILICO NPN 2N3646 FAIRCHILD 2N3646
Q27	200088	TRANS SILICO PNP 2N4248 FAIRCHILD 2N4248
Q28	2CC160	FET LEDEL LS4416
R01	000153	RES CARBON 15 K 5% 1/4 W OHMITE RC07GF153J
R03	000272	RES CARBON 2.7 K 5% 1/4 W OHMITE RC07GF272J
R04	000272	RES CARBON 2.7 K 5% 1/4 W OHMITE RC07GF272J
R05	000153	RES CARBON 15 K 5% 1/4 W OHMITE RC07GF153J
R06	000272	RES CARBON 2.7 K 5% 1/4 W OHMITE RC07GF272J
R07	000272	RES CARBON 2.7 K 5% 1/4 W OHMITE RC07GF272J
R08	000153	RES CARBON 15 K 5% 1/4 W OHMITE RC07GF153J
R09	000511	RES CARBON 510 OHM 5% 1/4 W OHMITE RC07GF511J
R10	000511	RES CARBON 510 OHM 5% 1/4 W OHMITE RC07GF511J
R11	000153	RES CARBON 15 K 5% 1/4 W OHMITE RC07GF153J
R12	00C392	RES CARBON 0003.9 K 5% 1/4 W OHMITE RC07GF392J
R13	00C104	RES CARBON 10C K 5% 1/4 W OHMITE RC07GF104J
R14	000202	RES CARBON 2 K 5% 1/4 W OHMITE RC07GF202J
R15	000392	RES CARBON 0003.9 K 5% 1/4 W OHMITE RC07GF392J
R16	00C392	RES CARBON 0003.9 K 5% 1/4 W OHMITE RC07GF392J
R17	000152	RES CARBON 1.5 K 5% 1/4 W OHMITE RC07GF152J
R18	00C104	RES CARBON 10C K 5% 1/4 W OHMITE RC07GF104J
R19	000104	RES CARBON 100 K 5% 1/4 W OHMITE RC07GF104J
R20	000562	RES CARBON 5.6 K 5% 1/4 W OHMITE RC07GF562J
R21	000362	RES CARBON 3.6 K 5% 1/4 W OHMITE RC07GF362J

PARTS LIST

ASSEMBLY 403432 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
R22	000511	RES	CARBON	510	OHM	5%	1/4 W	OHMITE	RC07GF511J
R23	000152	RES	CARBON	1.5	K	5%	1/4 W	OHMITE	RC07GF152J
R24	000104	RES	CARBON	100	K	5%	1/4 W	OHMITE	RC07GF104J
R25	000152	RES	CARBON	1.5	K	5%	1/4 W	OHMITE	RC07GF152J
R26	000104	RES	CARBON	100	K	5%	1/4 W	OHMITE	RC07GF104J
R27	000152	RES	CARBON	1.5	K	5%	1/4 W	OHMITE	RC07GF152J
R28	000303	RES	CARBON	30	K	5%	1/4 W	OHMITE	RC07GF303J
R29	000302	RES	CARBON	3	K	5%	1/4 W	OHMITE	RC07GF302J
R30	000302	RES	CARBON	3	K	5%	1/4 W	OHMITE	RC07GF302J
R31	000302	RES	CARBON	3	K	5%	1/4 W	OHMITE	RC07GF302J
R32	010169	RES	METAL	100	K	1%	1/4 W	ELECTRA	RN60C1003F
R33	000155	RES	CARBON	1.5	M	5%	1/4 W	OHMITE	RC07GF155J
R34	040180	POT		1	M	20%		CTS	360S105B
R35	000123	RES	CARBON	12	K	5%	1/4 W	OHMITE	RC07GF123J
R36	000102	RES	CARBON	1	K	5%	1/4 W	OHMITE	RC07GF102J
R37	010582	RES	METAL	30.1	K	1%	T-0	IRC	RN55D3012F
R38	000202	RES	CARBON	2	K	5%	1/4 W	OHMITE	RC07GF202J
R39	010580	RES	METAL	21	K	1%	T-0	IRC	RN55D2102F
R40	010582	RES	METAL	30.1	K	1%	T-0	IRC	RN55D3012F
R41	010647	RES	METAL	316	OHM	1%		IRC	RN65E3160F
R42	000270	RES	CARBON	27	OHM	5%	1/4 W	OHMITE	RC07GF270J
R43	040174	POT	CERMET	500	OHM			BECKMAN	79PR500
R44	010645	RES	METAL			1%	T-0	IRC	RN55D2371F
R45	403423	ASSEMBLY ZENER						DANA	403423
R46	000513	RES	CARBON	51	K	5%	1/4 W	OHMITE	RC07GF513J
R47	000562	RES	CARBON	5.6	K	5%	1/4 W	OHMITE	RC07GF562J
R48	000435	RES	CARBON	4.3	M	5%	1/4 W	OHMITE	RC07GF435J
R51	000302	RES	CARBON	3	K	5%	1/4 W	OHMITE	RC07GF302J
R53	000306	RES	CARBON	30	M	5%	1/4 W	OHMITE	RC07GF306J
R54	000156	RES	CARBON	15	M	5%	1/4 W	OHMITE	RC07GF156J
R55	040210	POT	CERMET	100	K		1 W	CTS	360S104B
R56	000511	RES	CARBON	510	OHM	5%	1/4 W	OHMITE	RC07GF511J
R57	000752	RES	CARBON	7.5	K	5%	1/4 W	OHMITE	RC07GF752J
R58	000101	RES	CARBON	100	OHM	5%	1/4 W	OHMITE	RC07GF101J
R59	040113	RES	VARI	100	K	10%		BECKMAN	79P100K

PARTS LIST

ASSEMBLY 4C3432 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
R60	000515	RES	CARBON	5.1	M	5%	1/4	W	OHMITE	RC07GF515J
R61	010586	RES		5	K	.02%			VISHAY	V53-1-M
R62	01C646	RES	METAL			1%	T-0		IRC	RN55D2491F
R63	000102	RES	CARBON	1	K	5%	1/4	W	OHMITE	RC07GF102J
R64	010586	RES		5	K	.02%			VISHAY	V53-1-M
R65	000306	RES	CARBON	30	M	5%	1/4	W	OHMITE	RC07GF306J
R66	000183	RES	CARBON	18	K	5%	1/4	W	OHMITE	RC07GF183J
R67	000156	RES	CARBON	15	M	5%	1/4	W	OHMITE	RC07GF156J
R68	040210	POT	CERMET	100	K		1	W	CTS	360S104B
R69	000392	RES	CARBON	0003.9	K	5%	1/4	W	OHMITE	RC07GF392J
R70	000103	RES	CARBON	10	K	5%	1/4	W	OHMITE	RC07GF103J
R71	000202	RES	CARBON	2	K	5%	1/4	W	OHMITE	RC07GF202J
R72	000200	RES	CARBON	20	OHM	5%	1/4	W	OHMITE	RC07GF200J
R73	010585	RES		3.6	K	.02%			VISHAT	V53-1
R74	000153	RES	CARBON	15	K	5%	1/4	W	OHMITE	RC07GF153J
R77	000101	RES	CARBON	100	OHM	5%	1/4	W	OHMITE	RC07GF101J
R78	000101	RES	CARBON	100	OHM	5%	1/4	W	OHMITE	RC07GF101J
R79	000330	RES	CARBON	33	K	5%	1/4	W	OHMITE	RC07GF330J
R80	000302	RES	CARBON	3	K	5%	1/4	W	OHMITE	RC07GF302J
R81	040190	POT	CERMET	500	OHM				BECKMAN	62PAR500Z
R82	000104	RES	CARBON	100	K	5%	1/4	W	OHMITE	RC07GF104J
R83	040211	POT	CERMET	500	OHM	20%			CTS	360S Series
T01	300057	TRANSFORMER							DANA	300057
T02	300057	TRANSFORMER							DANA	300057
T03	300057	TRANSFORMER							DANA	300057

PARTS LIST

ASSEMBLY 403434 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION						
AR01	230075	INTEGRATED CIRCUIT					FAIRCHILD	UA748C
AR02	230054	INTEGRATED CIRCUIT	LM301A				NAT SEMI	LM301A
CR01	220027	DIODE SILICO ZENER	1N749A				MOTOROLA	1N749A
CR02	220027	DIODE SILICO ZENER	1N749A				MOTOROLA	1N749A
CR07	220027	DIODE SILICO ZENER	1N749A				MOTOROLA	1N749A
CR08	211083	DIODE SILICO	018				DANA	211083
CR09	211083	DIODE SILICO	018				DANA	211083
CR10	221177	DIODE SILICO ZENER			1/4 W		MOTOROLA	M.2.4A25
CR11	220007	DIODE SILICO ZENER	1N751				MOTOROLA	1N751
CR12	220007	DIODE SILICO ZENER	1N751				MOTOROLA	1N751
CR13	210004	DIODE SILICO	SD4				DIODES IN SD4	
CR14	210004	DIODE SILICO	SD4				DIODES IN SD4	
CR15	211083	DIODE SILICO	018				DANA	211083
CR16	211083	DIODE SILICO	018				DANA	211083
CR17	211083	DIODE SILICO	018				DANA	211083
CR18	211083	DIODE SILICO	018				DANA	211083
CR19	211083	DIODE SILICO	018				DANA	211083
C01	120237	CAP POLY	.15 MFD	100 V		5%	NPC	KSC Series
C02	120237	CAP POLY	.15 MFD	100 V		5%	NPC	KSC Series
C03	121394	CAP MYLAR	.15 MFD	100 V		10%	CDE	WMF1P15
C04	101145	CAP CERAM	100 PFD	500 V		10%	AERCVCX	SCD1X5F
C05	121091	CAP MYLAR	.033 MFD	100 V		10%	CDE	WMF1533
C06	120070	CAP POLY	3000 PFD	100 V		5%	NPC	KSC Series
C07	100025	CAP CERAM	.005 MFD	100 V		20%	ERIE	835-000-X5V05
C08	120257	CAP POLY	5 PFD	630 V			NPC	KSO Series
C09	100051	CAP	3 PF				TCD	B1-0
C10	100012	CAP CERAM	33 PFD	500 V		10%	AERCVCX	TCD-N750
C11	121091	CAP MYLAR	.033 MFD	100 V		10%	CDE	WMF1533
C12	110125	CAP TANT	2.2 MFD	35 V			ITT	43212 17122
C13	110125	CAP TANT	2.2 MFD	35 V			ITT	43212 17122
C14	120257	CAP POLY	5 PFD	630 V			NPC	KSO Series
K01	310077	REED RELAY, SHIELD					ELECTROL	R2691-3
Q01	200136	TRANS					FAIRCHILD	SE4022
Q02	200136	TRANS					FAIRCHILD	SE4022
Q03	200088	TRANS SILICO PNP	2N4248				FAIRCHILD	2N4248

PARTS LIST

ASSEMBLY 403434 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION								
Q04	201084	TRANS GERMAN PNP			2N1304				TI	2N1304
Q05	200137	TRANS							FAIRCHILD	2N4248
Q06	200137	TRANS							FAIRCHILD	2N4248
Q07	200140	TRANS DUAL			TYPE 140 NPN				DANA	200140
Q08	200140	TRANS DUAL			TYPE 140 NPN				DANA	200140
Q09	200142	TRANS							FAIRCHILD	2N4249
Q10	200035	TRANS SILICO NPN			014				DANA	200035
Q11	200035	TRANS SILICO NPN			014				DANA	200035
Q12	200142	TRANS							FAIRCHILD	2N4249
Q13	200035	TRANS SILICO NPN			014				DANA	200035
Q14	200035	TRANS SILICO NPN			014				DANA	200035
Q15	200137	TRANS							FAIRCHILD	2N4248
Q16	200137	TRANS							FAIRCHILD	2N4248
Q17	200137	TRANS							FAIRCHILD	2N4248
Q18	200137	TRANS							FAIRCHILD	2N4248
Q19	200137	TRANS							FAIRCHILD	2N4248
Q20	200137	TRANS							FAIRCHILD	2N4248
R01	010536	RES	METAL		100 K	1%	T-0		IRC	RN55D1003F
R02	010621	RES	METAL FILM		49.9 K	1%			IRC	RN55C
R03	000245	RES	CARBON	2.4 M		5%	1/4 W		CHMITE	RC07GF245J
R04	000153	RES	CARBON	15 K		5%	1/4 W		CHMITE	RC07GF153J
R05	000202	RES	CARBON	2 K		5%	1/4 W		CHMITE	RC07GF202J
R06	000220	RES	CARBON	22 OHM		5%	1/4 W		OHMITE	RC07GF220J
R07	000912	RES	CARBON	9.1 K		5%	1/4 W		CHMITE	RC07GF912J
R08	020582	RES		18 K		5%	3 W		C-F	M-20
R09	000103	RES	CARBON	10 K		5%	1/4 W		CHMITE	RC07GF103J
R10	010529	RES		10 K		1%			IRC	RN55D
R11	000181	RES	CARBON	180 OHM		5%	1/4 W		OHMITE	RC07GF181J
R12	040113	RES	VARI	100 K		10%			BECKMAN	79P100K
R13	000107	RES	CARBON	100 M		5%	1/4 W		OHMITE	RC07GF107J
R14	001737	RES	FSV			5%	1/4 W		DANA	001737
R15	010584	RES	SET	T-2		1%			PYROFILM	PME70
R16	001737	RES	FSV			5%	1/4 W		DANA	001737
R17	010584	RES	SET	T-2		1%			PYROFILM	PME70
R18	000221	RES	CARBON	220 OHM		5%	1/4 W		OHMITE	RC07GF221J

PARTS LIST

ASSEMBLY 403434 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
R19	011178	RES	METAL	4.99 K	1%	1/4 W	ELECTRA	RN20X4994F	
R20	000622	RES	CARBON	6.2 K	5%	1/4 W	OHMITE	RC07GF622J	
R21	000430	RES	CARBON	43 OHM	5%	1/4 W	OHMITE	RC07GF430J	
R22	000153	RES	CARBON	15 K	5%	1/4 W	OHMITE	RC07GF153J	
R23	000681	RES	CARBON	680 OHM	5%	1/4 W	OHMITE	RC07GF681J	
R24	000202	RES	CARBON	2 K	5%	1/4 W	OHMITE	RC07GF202J	
R25	000821	RES	CARBON	820 OHM	5%	1/4 W	OHMITE	RC07GF821J	
R26	000273	RES	CARBON	27 K	5%	1/4 W	OHMITE	RC07GF273J	
R27	000330	RES	CARBON	33 K	5%	1/4 W	OHMITE	RC07GF330J	
R28	000161	RES	CARBON	160 OHM	5%	1/4 W	OHMITE	RC07GF161J	
R29	000111	RES	CARBON	110 OHM	5%	1/4 W	OHMITE	RC07GF111J	
R30	000220	RES	CARBON	22 OHM	5%	1/4 W	OHMITE	RC07GF220J	
R31	000430	RES	CARBON	43 OHM	5%	1/4 W	OHMITE	RC07GF430J	
R32	000820	RES	CARBON	82 OHM	5%	1/4 W	OHMITE	RC07GF820J	
R33	000273	RES	CARBON	27 K	5%	1/4 W	OHMITE	RC07GF273J	
R34	000100	RES	CARBON	10 OHM	5%	1/4 W	OHMITE	RC07GF100J	
R35	001737	RES	FSV		5%	1/4 W	DANA	001737	
R36	040113	RES	VARI	100 K	10%		BECKMAN	79P100K	

PARTS LIST

ASSEMBLY 403435 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
CR01	220011	DIODE SILICO ZENER 1N968A						MOTORCLA	1N968A
CR02	211083	DIODE SILICO			018			DANA	211083
CR03	211083	DIODE SILICO			018			DANA	211083
CR04	211083	DIODE SILICO			018			DANA	211083
CR05	211083	DIODE SILICO			C18			DANA	211083
CR06	220007	DIODE SILICO ZENER 1N751						MOTORCLA	1N751
CR07	211083	DIODE SILICO			018			DANA	211083
CR08	211083	DIODE SILICO			C18			DANA	211083
CR10	211083	DIODE SILICO			018			DANA	211083
CR11	211083	DIODE SILICO			018			DANA	211083
CR12	211083	DIODE SILICO			018			DANA	211083
CR13	211083	DIODE SILICO			018			DANA	211083
CR14	211083	DIODE SILICO			018			DANA	211083
CR15	220007	DIODE SILICO ZENER 1N751						MOTORCLA	1N751
CR16	211083	DIODE SILICO			018			DANA	211083
CR17	211083	DIODE SILICO			018			DANA	211083
CR18	220007	DIODE SILICO ZENER 1N751						MOTORCLA	1N751
CR19	220007	DIODE SILICO ZENER 1N751						MOTORCLA	1N751
CR20	220011	DIODE SILICO ZENER 1N968A						MOTORCLA	1N968A
CR21	220060	DIODE ZENER				24 V	5%	MOTOROLA	1N970B
C01	120034	CAP	POLYS	100	PFD	500 V	5%	CRL	CPR-100J
C02	100017	CAP	CERAM	.01	MFD	200 V	10%	SPRAGUE	TH-S10
C03	121091	CAP	MYLAR	.033	MFD	100 V	10%	CDE	WMF1533
C04	100012	CAP	CERAM	33	PFD	500 V	10%	AERCVCX	TCD-N750
C05	100012	CAP	CERAM	33	PFD	500 V	10%	AERCVCX	TCD-N750
C06	120001	CAP	MYLAR	.0033	MFD	100 V	10%	CDE	WMF1D33
C07	100017	CAP	CERAM	.01	MFD	200 V	10%	SPRAGUE	TH-S10
C08	121093	CAP	MYLAR	.047	MFD	100 V	10%	CDE	WMF1S47
C09	120001	CAP	MYLAR	.0033	MFD	100 V	10%	CDE	WMF1D33
C10	100017	CAP	CERAM	.01	MFD	200 V	10%	SPRAGUE	TH-S10
C11	100012	CAP	CERAM	33	PFD	500 V	10%	AERCVCX	TCD-N750
C12	100017	CAP	CERAM	.01	MFD	200 V	10%	SPRAGUE	TH-S10
C13	100012	CAP	CERAM	33	PFD	500 V	10%	AERCVCX	TCD-N750
C14	110129	CAP	TANTA	.1MF		35V		ITT	4321217010

PARTS LIST

ASSEMBLY 403435 - Model 4800

A

REF. DESIG.	PART NO.	DESCRIPTION				
K01	310077	REED RELAY, SHIELD				ELECTROL R2691-3
K02	310078	REED RELAY, SHIELD				ELECTROL R2690-3
K03	310077	REED RELAY, SHIELD				ELECTROL R2691-3
K04	310077	REED RELAY, SHIELD				ELECTROL R2691-3
K05	310077	REED RELAY, SHIELD				ELECTROL R2691-3
M01	230054	INTEGRATED CIRCUIT	LM301A			NAT SEMI LM301A
M02	403494	AMP KIT	FSV	1/4 W		DANA 403393
M03	230054	INTEGRATED CIRCUIT	LM301A			NAT SEMI LM301A
M04	230054	INTEGRATED CIRCUIT	LM301A			NAT SEMI LM301A
M05	230054	INTEGRATED CIRCUIT	LM301A			NAT SEMI LM301A
Q01	200160	FET				LEDEL LS4416
Q02	200137	TRANS				FAIRCHILD 2N4248
Q03	200137	TRANS				FAIRCHILD 2N4248
Q04	200137	TRANS				FAIRCHILD 2N4248
Q05	200137	TRANS				FAIRCHILD 2N4248
Q06	200135	FET KIT				DANA 200135
Q07	200068	TRANS	2N4250			FAIRCHILD 2N4250
Q08	200088	TRANS SILICO PNP	2N4248			FAIRCHILD 2N4248
Q09	200043	TRANS SILICO NPN	2N3565			FAIRCHILD 2N3565
Q10	200088	TRANS SILICO PNP	2N4248			FAIRCHILD 2N4248
Q11	200035	TRANS SILICO NPN	014			DANA 200035
Q12	200160	FET				LEDEL LS4416
Q13	200035	TRANS SILICO NPN	014			DANA 200035
Q14	201084	TRANS GERMAN PNP	2N1304			TI 2N1304
Q15	200011	TRANS SILICO PNP	009			DANA 200011
Q16	200011	TRANS SILICO PNP	009			DANA 200011
Q17	200137	TRANS				FAIRCHILD 2N4248
Q18	200137	TRANS				FAIRCHILD 2N4248
Q19	200137	TRANS				FAIRCHILD 2N4248
R01	000203	RES CARBON	20 K	5%	1/4 W	CHMITE RC07GF203J
R02	021154	RES WW	10 K	3%	1/4 W	C-F C-FM20
R04	011178	RES METAL	4.99 K	1%	1/4 W	ELECTRA RN20X4994F
R05	021154	RES WW	10 K	3%	1/4 W	C-F C-FM20
R06	021154	RES WW	10 K	3%	1/4 W	C-F C-FM20

PARTS LIST

ASSEMBLY 403435 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
R07	01C671	RES		494.8 K	.25%	T-0	PYROFILM	PME60	
R08	010615	RES		10 K	.02%		VISHAY	V53-1	
R09	010615	RES		10 K	.02%		VISHAY	V53-1	
R10	02C611	RES		200 OHM	.02%		NANSISTOR	5Q12A	
R11	020615	RES	WW	4.8 K	1%		NANISTOR	5Q12A	
R12	01C621	RES	METAL FILM	49.9 K	1%		IRC	RN55C	
R13	01C621	RES	METAL FILM	49.9 K	1%		IRC	RN55C	
R14	001737	RES	FSV		5%	1/4 W	DANA	001737	
R15	001737	RES	FSV		5%	1/4 W	DANA	001737	
R16	001737	RES	FSV		5%	1/4 W	DANA	001737	
R17	000472	RES	CARBON	4.7 K	5%	1/4 W	CHMITE	RC07GF472J	
R18	000151	RES	CARBON	150 OHM	5%	1/4 W	CHMITE	RC07GF151J	
R19	040173	POT	CERMET	5 K			BECKMAN	79PR5K	
R20	000106	RES	CARBON	10 M	5%	1/4 W	CHMITE	RC07GF106J	
R21	000514	RES	CARBON	510 K	5%	1/4 W	CHMITE	RC07GF524J	
R22	001737	RES	FSV		5%	1/4 W	DANA	001737	
R23	04C169	POT	CERMET	20 OHM	20%		BECKMAN	70PR20	
R24	01C652	RES		4.99 K	.05%		VISHAY	V53-1	
R25	040113	RES	VARI	10C K	10%		BECKMAN	79P100K	
R26	000244	RES	CARBON	240 K	5%	1/4 W	CHMITE	RC07GF244J	
R27	01C091	RES	METAL	11 K	1%	1/4 W	ELECTRA	RN60D1102F	
R28	000182	RES	CARBON	1.8 K	5%	1/4 W	CHMITE	RC07GF182J	
R29	040113	RES	VARI	10C K	10%		BECKMAN	79P100K	
R30	01C703	RES	METAL	555.50 OHM	.05%		VISHAY	V53-1	
R31	000113	RES	CARBON	11 K	5%	1/4 W	CHMITE	RC07GF113J	
R32	000202	RES	CARBON	2 K	5%	1/4 W	CHMITE	RC07GF202J	
R33	000563	RES	CARBON	56 K	5%	1/4 W	CHMITE	RC07GF563J	
R34	000101	RES	CARBON	100 OHM	5%	1/4 W	OHMITE	RC07GF101J	
R35	04C168	POT	CERMET	200 OHM	10%		BECKMAN	79PR200	
R36	020604	RES		100 K	.05%		JORDAN	J-11	
R37	040182	POT		250 K	20%		CTS	360S254B	
R38	010682	RES	CARBON	9.8 M	1%		DALE	DCS1/2	
R39	000203	RES	CARBON	20 K	5%	1/4 W	CHMITE	RC07GF203J	
R40	000101	RES	CARBON	100 OHM	5%	1/4 W	OHMITE	RC07GF101J	
R41	000221	RES	CARBON	220 OHM	5%	1/4 W	OHMITE	RC07GF221J	

PARTS LIST

ASSEMBLY 403435 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
R42	040112	RES	VARI	2	K			BECKMAN	79PR2K
R43	020612	RES		1.009	M	.05%		JORDAN	J-12
R44	040172	POT	CERMET	50	K			BECKMAN	79PR50K
R45	010655	RES		11.086	M	.1%	T-9	PYROFILM	PME70
R46	000511	RES	CARBON	510	OHM	5%	1/4 W	OHMITE	RC07GF511J
R47	010654	RES		20	K	.05%		VISHAY	V53-1
R49	010615	RES		10	K	.02%		VISHAY	V53-1
R50	040113	RES	VARI	100	K	10%		BECKMAN	79P100K
R51	010656	RES		19.948	M	.1%	T-9	PYROFILM	PME75
R52	010615	RES		10	K	.02%		VISHAY	V53-1
R53	010586	RES		5	K	.02%		VISHAY	V53-1-M
R54	040113	RES	VARI	100	K	10%		BECKMAN	79P100K
R55	000472	RES	CARBON	4.7	K	5%	1/4 W	OHMITE	RC07GF472J
R56	000181	RES	CARBON	180	OHM	5%	1/4 W	OHMITE	RC07GF181J
R57	001100	RES	CARBON	2.2	K	5%	1/2 W	OHMITE	RC20GF222J
R58	010654	RES		20	K	.05%		VISHAY	V53-1
R59	000202	RES	CARBON	2	K	5%	1/4 W	OHMITE	RC07GF202J
R60	000101	RES	CARBON	100	OHM	5%	1/4 W	OHMITE	RC07GF101J
R61	000273	RES	CARBON	27	K	5%	1/4 W	OHMITE	RC07GF273J
R62	000331	RES	CARBON	330	OHM	5%	1/4 W	OHMITE	RC07GF331J
R63	000820	RES	CARBON	82	OHM	5%	1/4 W	OHMITE	RC07GF820J
R64	000222	RES	CARBON	2.2	K	5%	1/4 W	OHMITE	RC07GF222J
R65	001100	RES	CARBON	2.2	K	5%	1/2 W	OHMITE	RC20GF222J
R66	040085	RES	VARI	500	K	30%		BECKMAN	79PR500K
R67	000202	RES	CARBON	2	K	5%	1/4 W	OHMITE	RC07GF202J
R68	403494	AMP KIT		FSV			1/4 W	DANA	403494
R69	403494	AMP KIT		FSV			1/4 W	DANA	403494

PARTS LIST

ASSEMBLY 403431 - Model 4800

REF. DESIG.	PART NO.	DESCRIPTION			
CR01	210021	DIODE		DANA	210021
CR02	210021	DIODE		DANA	210021
CR03	210021	DIODE		DANA	210021
CR04	210021	DIODE		DANA	210021
CR05	211083	DIODE SILICO	018	DANA	211083
CR06	220007	DIODE SILICO ZENER	1N751	MOTOROLA	1N751
CR07	211083	DIODE SILICO	018	DANA	211083
CR08	211083	DIODE SILICO	018	DANA	211083
CR09	211083	DIODE SILICO	018	DANA	211083
CR10	211083	DIODE SILICO	018	DANA	211083
CR11	211083	DIODE SILICO	018	DANA	211083
CR12	211083	DIODE SILICO	018	DANA	211083
CR13	211083	DIODE SILICO	018	DANA	211083
CR14	211083	DIODE SILICO	018	DANA	211083
CR15	211083	DIODE SILICO	018	DANA	211083
C01	100040	CAP	200 PF	SPRAGUE	5GA-T20
K01	310060	RELAY	1000 V	P&B	R10E1223-2
K02	310060	RELAY	1000 V	P&B	R10E1223-2
K03	310060	RELAY	1000 V	P&B	R10E1223-2
M01	230073	INTEGRATED CIRCUIT		LIBERTY	SN7405N
M02	230029	INTEGRATED CIRCUIT		TI	SN7401N
M03	230073	INTEGRATED CIRCUIT		LIBERTY	SN7405N
M04	230034	INTEGRATED CIRCUIT		TI	SN7441N
Q01	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q02	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q03	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q04	200037	TRANS SILICO NPN	2N3646	FAIRCHILD	2N3646
Q05	200132	TRANS		FAIRCHILD	FPT100
Q06	200132	TRANS		FAIRCHILD	FPT100
Q07	200132	TRANS		FAIRCHILD	FPT100
Q08	200132	TRANS		FAIRCHILD	FPT100
Q09	200043	TRANS SILICO NPN	2N3565	FAIRCHILD	2N3565
Q10	200043	TRANS SILICO NPN	2N3565	FAIRCHILD	2N3565
Q11	200043	TRANS SILICO NPN	2N3565	FAIRCHILD	2N3565
Q12	200043	TRANS SILICO NPN	2N3565	FAIRCHILD	2N3565

PARTS LIST

ASSEMBLY 403431 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
Q13	20CC37	TRANS SILICO NPN			2N3646			FAIRCHILD	2N3646
Q14	200037	TRANS SILICO NPN			2N3646			FAIRCHILD	2N3646
Q15	200037	TRANS SILICO NPN			2N3646			FAIRCHILD	2N3646
R01	000103	RES	CARBON	10 K	5%	1/4 W		OHMITE	RC07GF103J
R02	000182	RES	CARBON	1.8 K	5%	1/4 W		OHMITE	RC07GF182J
R03	000182	RES	CARBON	1.8 K	5%	1/4 W		OHMITE	RC07GF182J
R04	000182	RES	CARBON	1.8 K	5%	1/4 W		OHMITE	RC07GF182J
R05	000182	RES	CARBON	1.8 K	5%	1/4 W		OHMITE	RC07GF182J
R06	000103	RES	CARBON	10 K	5%	1/4 W		OHMITE	RC07GF103J
R07	000103	RES	CARBON	10 K	5%	1/4 W		OHMITE	RC07GF103J
R08	000750	RES	CARBON	75 OHM	5%	1/4 W		OHMITE	RC07GF750J
R09	000750	RES	CARBON	75 OHM	5%	1/4 W		OHMITE	RC07GF750J
R10	000750	RES	CARBON	75 OHM	5%	1/4 W		OHMITE	RC07GF750J
R11	000750	RES	CARBON	75 OHM	5%	1/4 W		OHMITE	RC07GF750J
R12	000103	RES	CARBON	10 K	5%	1/4 W		OHMITE	RC07GF103J
R13	000103	RES	CARBON	10 K	5%	1/4 W		OHMITE	RC07GF103J
R14	000203	RES	CARBON	20 K	5%	1/4 W		OHMITE	RC07GF203J
R15	000203	RES	CARBON	20 K	5%	1/4 W		OHMITE	RC07GF203J
R16	000203	RES	CARBON	20 K	5%	1/4 W		OHMITE	RC07GF203J
R17	000203	RES	CARBON	20 K	5%	1/4 W		OHMITE	RC07GF203J
R18	000102	RES	CARBON	1 K	5%	1/4 W		OHMITE	RC07GF102J
R19	000103	RES	CARBON	10 K	5%	1/4 W		OHMITE	RC07GF103J
R20	000103	RES	CARBON	10 K	5%	1/4 W		OHMITE	RC07GF103J
R21	000103	RES	CARBON	10 K	5%	1/4 W		OHMITE	RC07GF103J
R22	000103	RES	CARBON	10 K	5%	1/4 W		OHMITE	RC07GF103J
R23	000102	RES	CARBON	1 K	5%	1/4 W		OHMITE	RC07GF102J
R24	000102	RES	CARBON	1 K	5%	1/4 W		OHMITE	RC07GF102J
R25	001758	RES	CARBON	330 OHM	5%	1 W		OHMITE	RC32GF331J
R26	001784	RES		910 OHM	5%	1/2 W			
R27	000305	RES	CARBON	3 M	5%	1/4 W		OHMITE	RC07GF305J

PARTS LIST

ASSEMBLY 403470 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION						
AR01	230091	INTEGRATED CIRCUIT			UA725		DANA	230091
AR02	230091	INTEGRATED CIRCUIT			UA725		DANA	230091
AR03	230091	INTEGRATED CIRCUIT			UA725		DANA	230091
AR04	230070	INTEGRATED CIRCUIT			LA725		FAIRCHILD	U5B7725393
B01	920563	BEADS					FERX CBE	56-59065-4B
B02	920563	BEADS					FERX CBE	56-59065-4B
B03	920563	BEADS					FERX CBE	56-59065-4B
B04	920563	BEADS					FERX CBE	56-59065-4B
B05	920563	BEADS					FERX CBE	56-59065-4B
B06	920563	BEADS					FERX CBE	56-59065-4B
CR01	211083	DIODE SILICO			018		DANA	211083
CR02	220016	DIODE SILICO ZENER			1N964B		MOTOROLA	1N964B
CR03	220004	DIODE SILICO ZENER			1N961B		MOTOROLA	1N961B
CR04	220004	DIODE SILICO ZENER			1N961B		MOTOROLA	1N961B
CR05	220004	DIODE SILICO ZENER			1N961B		MOTOROLA	1N961B
CR06	220004	DIODE SILICO ZENER			1N961B		MOTOROLA	1N961B
CR07	210035	DIODE					HP	5082-2810
CR08	210035	DIODE					HP	5082-2810
CR09	210035	DIODE					HP	5082-2810
CR10	210035	DIODE					HP	5082-2810
CR11	220004	DIODE SILICO ZENER			1N961B		MOTOROLA	1N961B
CR12	220004	DIODE SILICO ZENER			1N961B		MOTOROLA	1N961B
CR13	210035	DIODE					HP	5082-2810
CR14	210035	DIODE					HP	5082-2810
C01	11C140	CAP	TANTA	47 MFD	6.3 V		ITT	4-3212-12247
C02	11C140	CAP	TANTA	47 MFD	6.3 V		ITT	4-3212-12247
C03	11C141	CAP		22 MFD	16 V		ITT	43212-14222
C04	130131	CAP		20 PFD	100 V		AMPEREX	C010KA/20E
C05	100050	CAP					SPRAGUE	10TCC-V22
C06	100081	CAP		4.7 PFD	1000 V		SPRAGUE	C030B102E4R7D
C07	100050	CAP					SPRAGUE	10TCC-V22
C08	130131	CAP		20 PFD	100 V		AMPEREX	C010KA/20E
C09	100017	CAP	CERAM	.01 MFD	200 V	10%	SPRAGUE	TH-S10
C10	100017	CAP	CERAM	.01 MFD	200 V	10%	SPRAGUE	TH-S10

PARTS LIST

ASSEMBLY 403470 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION					
C11	100080	CAP		.05 MFD 100 V	20%	SPRAGUE	TG-S50
C12	100080	CAP		.05 MFD 100 V	20%	SPRAGUE	TG-S50
C13	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C14	100081	CAP		4.7 PFD 1000 V		SPRAGUE	C030B102E4R7D
C15	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C16	110151	CAP		10 MFD 25 V		ITT	43212-16210
C17	100080	CAP		.05 MFD 100 V	20%	SPRAGUE	TG-S50
C18	100080	CAP		.05 MFD 100 V	20%	SPRAGUE	TG-S50
C19	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C20	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C21	101098	CAP	CERAM	330 PFD 500 V	10%	AERCVCX	SCD1X5F
C22	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C23	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C24	101098	CAP	CERAM	330 PFD 500 V	10%	AERCVCX	SCD1X5F
C25	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C26	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C27	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C28	100056	CAP	DISC			SPRAGUE	10TCC-V82
C29	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C30	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C31	100056	CAP	DISC			SPRAGUE	10TCC-V82
C32	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C33	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C34	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C35	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C36	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C37	110141	CAP		22 MFD 16 V		ITT	43212-14222
C38	110151	CAP		10 MFD 25 V		ITT	43212-16210
C39	110141	CAP		22 MFD 16 V		ITT	43212-14222
C40	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C41	130131	CAP		20 PFD 100 V		AMPEREX	C010KA/20E
C42	120025	CAP	MYLAR	1.5 MFD 100 V	10%	IMB	XA281551C
C43	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C44	100080	CAP		.05 MFD 100 V	20%	SPRAGUE	TG-S50
C45	100068	CAP	CERAM	.02 MFD 100 V	20%	SPRAGUE	TG-S20

PARTS LIST

ASSEMBLY 4C3470 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION					
C46	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C47	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C48	100080	CAP		.05 MFD 100 V	20%	SPRAGUE	TG-S50
C49	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C50	100081	CAP		4.7 PFD 1000 V		SPRAGUE	C030B102E4R7D
C51	100080	CAP		.05 MFD 100 V	20%	SPRAGUE	TG-S50
C52	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C53	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C54	101098	CAP	CERAM	330 PFD 500 V	10%	AERCVCX	SCD1X5F
C55	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C56	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C57	100056	CAP	DISC			SPRAGUE	10TCC-V82
C58	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C59	110126	CAP	TANTA	6.8 MFD 35 V		ITT	4312 17168
C60	100017	CAP	CERAM	.01 MFD 200 V	10%	SPRAGUE	TH-S10
C61	110151	CAP		10 MFD 25 V		ITT	43212-16210
Q01	200179	TRANS, FET				MOTOROLA	2N4391
Q02	200129	TRANS				FAIRCHILD	SE4020
Q03	200176	TRANS				FAIRCHILD	SE3005
Q04	200176	TRANS				FAIRCHILD	SE3005
Q05	200176	TRANS				FAIRCHILD	SE3005
Q06	200178	TRANS				FAIRCHILD	2N5910
Q07	200176	TRANS				FAIRCHILD	SE3005
Q08	200178	TRANS				FAIRCHILD	2N5910
Q09	200176	TRANS				FAIRCHILD	SE3005
Q10	200176	TRANS				FAIRCHILD	SE3005
Q11	200176	TRANS				FAIRCHILD	SE3005
Q12	200178	TRANS				FAIRCHILD	2N5910
Q13	200176	TRANS				FAIRCHILD	SE3005
Q14	200176	TRANS				FAIRCHILD	SE3005
Q15	200178	TRANS				FAIRCHILD	2N5910
Q16	200176	TRANS				FAIRCHILD	SE3005
Q17	200176	TRANS				FAIRCHILD	SE3005
Q18	200176	TRANS				FAIRCHILD	SE3005
Q19	200178	TRANS				FAIRCHILD	2N5910

PARTS LIST

ASSEMBLY 403470 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION								
Q20	200176	TRANS							FAIRCHILD	SE3005
Q21	200176	TRANS							FAIRCHILD	SE3005
Q22	200178	TRANS							FAIRCHILD	2N5910
Q23	200176	TRANS							FAIRCHILD	SE3005
R01	010727	RES		2.5	K	.01%			VISHAY	V53-3-M
R03	020628	RES	WW	120.42	K	.02%			JORDAN	J-9D
R04	000100	RES	CARBON	10	OHM	5%	1/4	W	OHMITE	RC07GF100J
R05	020629	RES	WW	438.19	K	.02%			JORDAN	J-11D
R06	010586	RES		5	K	.02%			VISHAY	V53-1-M
R07	010727	RES		2.5	K	.01%			VISHAY	V53-3-M
R08	010615	RES		10	K	.02%			VISHAY	V53-1
R09	000513	RES	CARBON	51	K	5%	1/4	W	OHMITE	RC07GF513J
R10	000103	RES	CARBON	10	K	5%	1/4	W	OHMITE	RC07GF103J
R100	010529	RES		10	K	1%			IRC	RN55D
R101	000101	RES	CARBON	100	OHM	5%	1/4	W	OHMITE	RC07GF101J
R102	000303	RES	CARBON	30	K	5%	1/4	W	OHMITE	RC07GF303J
R103	000101	RES	CARBON	100	OHM	5%	1/4	W	OHMITE	RC07GF101J
R104	000510	RES	CARBON	51	OHM	5%	1/4	W	OHMITE	RC07GF510J
R105	000101	RES	CARBON	100	OHM	5%	1/4	W	OHMITE	RC07GF101J
R106	000101	RES	CARBON	100	OHM	5%	1/4	W	OHMITE	RC07GF101J
R107	000161	RES	CARBON	160	OHM	5%	1/4	W	OHMITE	RC07GF161J
R108	000911	RES	CARBON	910	OHM	5%	1/4	W	OHMITE	RC07GF911J
R109	000101	RES	CARBON	100	OHM	5%	1/4	W	OHMITE	RC07GF101J
R11	000102	RES	CARBON	1	K	5%	1/4	W	OHMITE	RC07GF102J
R110	000101	RES	CARBON	100	OHM	5%	1/4	W	OHMITE	RC07GF101J
R111	000103	RES	CARBON	10	K	5%	1/4	W	OHMITE	RC07GF103J
R112	001737	RES	FSV			5%	1/4	W	DANA	001737
R112	600245	JUMPER							GETTIG	L-2007-1
R113	000107	RES	CARBON	100	M	5%	1/4	W	OHMITE	RC07GF107J
R114	000110	RES	CARBON	11	OHM	5%	1/4	W	OHMITE	RC07GF110J
R12	000561	RES	CARBON	560	OHM	5%	1/4	W	OHMITE	RC07GF561J
R13	000242	RES	CARBON	2.4	K	5%	1/4	W	OHMITE	RC07GF242J
R14	000103	RES	CARBON	10	K	5%	1/4	W	OHMITE	RC07GF103J
R15	000103	RES	CARBON	10	K	5%	1/4	W	OHMITE	RC07GF103J
R16	000621	RES	CARBON	620	OHM	5%	1/4	W	OHMITE	RC07GF621J

PARTS LIST

ASSEMBLY 403470 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION						
R17	000561	RES	CARBON	560 OHM	5%	1/4 W	OHMITE	RC07GF561J
R18	000107	RES	CARBON	100 M	5%	1/4 W	OHMITE	RC07GF107J
R19	000107	RES	CARBON	100 M	5%	1/4 W	OHMITE	RC07GF107J
R20	000107	RES	CARBON	100 M	5%	1/4 W	OHMITE	RC07GF107J
R21	000107	RES	CARBON	100 M	5%	1/4 W	OHMITE	RC07GF107J
R22	000102	RES	CARBON	1 K	5%	1/4 W	OHMITE	RC07GF102J
R23	000242	RES	CARBON	2.4 K	5%	1/4 W	OHMITE	RC07GF242J
R24	000102	RES	CARBON	1 K	5%	1/4 W	OHMITE	RC07GF102J
R25	000362	RES	CARBON	3.6 K	5%	1/4 W	OHMITE	RC07GF362J
R26	040191	POT	CERMET	1 M			BECKMAN	79P
R27	040133	RES	VARI	200 K	10%		BECKMAN	79PR200K
R28	000150	RES	CARBON	15 OHM	5%	1/4 W	OHMITE	RC07GF15CJ
R29	000100	RES	CARBON	10 OHM	5%	1/4 W	OHMITE	RC07GF100J
R30	040191	POT	CERMET	1 M			BECKMAN	79P
R31	040133	RES	VARI	200 K	10%		BECKMAN	79PR200K
R32	000150	RES	CARBON	15 OHM	5%	1/4 W	OHMITE	RC07GF15CJ
R34	000100	RES	CARBON	10 OHM	5%	1/4 W	OHMITE	RC07GF100J
R35	000303	RES	CARBON	30 K	5%	1/4 W	OHMITE	RC07GF303J
R36	000101	RES	CARBON	100 OHM	5%	1/4 W	OHMITE	RC07GF101J
R37	000303	RES	CARBON	30 K	5%	1/4 W	OHMITE	RC07GF303J
R38	000101	RES	CARBON	100 OHM	5%	1/4 W	OHMITE	RC07GF101J
R39	000163	RES	CARBON	16 K	5%	1/4 W	OHMITE	RC07GF163J
R40	000303	RES	CARBON	30 K	5%	1/4 W	OHMITE	RC07GF303J
R41	000163	RES	CARBON	16 K	5%	1/4 W	OHMITE	RC07GF163J
R42	000303	RES	CARBON	30 K	5%	1/4 W	OHMITE	RC07GF303J
R43	01C529	RES		10 K	1%		IRC	RN55D
R44	000101	RES	CARBON	100 OHM	5%	1/4 W	OHMITE	RC07GF101J
R45	01C529	RES		10 K	1%		IRC	RN55D
R46	000101	RES	CARBON	100 OHM	5%	1/4 W	OHMITE	RC07GF101J
R47	000303	RES	CARBON	30 K	5%	1/4 W	OHMITE	RC07GF303J
R48	000303	RES	CARBON	30 K	5%	1/4 W	OHMITE	RC07GF303J
R49	000101	RES	CARBON	100 OHM	5%	1/4 W	OHMITE	RC07GF101J
R50	000510	RES	CARBON	51 OHM	5%	1/4 W	OHMITE	RC07GF510J
R51	000101	RES	CARBON	100 OHM	5%	1/4 W	OHMITE	RC07GF101J
R52	000101	RES	CARBON	100 OHM	5%	1/4 W	OHMITE	RC07GF101J

PARTS LIST

ASSEMBLY 403470 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
R53	000101	RES	CARBON	100	OHM	5%	1/4 W	OHMITE	RC07GF101J
R54	000510	RES	CARBON	51	OHM	5%	1/4 W	OHMITE	RC07GF510J
R55	000101	RES	CARBON	100	OHM	5%	1/4 W	OHMITE	RC07GF101J
R56	000101	RES	CARBON	100	OHM	5%	1/4 W	OHMITE	RC07GF101J
R57	000161	RES	CARBON	160	OHM	5%	1/4 W	OHMITE	RC07GF161J
R58	000911	RES	CARBON	910	OHM	5%	1/4 W	OHMITE	RC07GF911J
R59	000161	RES	CARBON	160	OHM	5%	1/4 W	OHMITE	RC07GF161J
R60	000911	RES	CARBON	910	OHM	5%	1/4 W	OHMITE	RC07GF911J
R61	000101	RES	CARBON	100	OHM	5%	1/4 W	OHMITE	RC07GF101J
R62	000101	RES	CARBON	100	OHM	5%	1/4 W	OHMITE	RC07GF101J
R63	000101	RES	CARBON	100	OHM	5%	1/4 W	OHMITE	RC07GF101J
R64	000101	RES	CARBON	100	OHM	5%	1/4 W	OHMITE	RC07GF101J
R65	000103	RES	CARBON	10	K	5%	1/4 W	OHMITE	RC07GF103J
R66	000103	RES	CARBON	10	K	5%	1/4 W	OHMITE	RC07GF103J
R67	010615	RES			10 K		.02%	VISHAY	V53-1
R68	040123	RES	VARI	1	K			BECKMAN	62PRIK
R69	020627	RES	WW	81.73	K		.02%	JORDAN	J-9D
R70	010586	RES		5	K		.02%	VISHAY	V53-1-M
R71	010726	RES	METAL	10.71	K		.1%	IRC	RN55C
R72	010730	RES		5.355	K		.01%	VISHAY	V53-3-M
R73	010729	RES		31.31	K		.02%	VISHAY	V53-3-M
R74	040191	POT	CERMET	1	M			BECKMAN	79P
R75	000107	RES	CARBON	100	M	5%	1/4 W	OHMITE	RC07GF107J
R76	000107	RES	CARBON	100	M	5%	1/4 W	OHMITE	RC07GF107J
R77	000392	RES	CARBON	0003.9	K	5%	1/4 W	OHMITE	RC07GF392J
R78	010728	RES		33.91	K		.02%	VISHAY	V53-3-M
R79	010615	RES			10 K		.02%	VISHAY	V53-1
R80	000561	RES	CARBON	560	OHM	5%	1/4 W	OHMITE	RC07GF561J
R81	000103	RES	CARBON	10	K	5%	1/4 W	OHMITE	RC07GF103J
R82	010661	RES		10	K		.01%	VISHAY	V53-3-M
R83	040133	RES	VARI	200	K	10%		BECKMAN	79PR200K
R84	000100	RES	CARBON	10	OHM	5%	1/4 W	OHMITE	RC07GF100J
R85	000561	RES	CARBON	560	OHM	5%	1/4 W	OHMITE	RC07GF561J
R86	000390	RES	CARBON	39	OHM	5%	1/4 W	OHMITE	RC07GF390J
R87	000103	RES	CARBON	10	K	5%	1/4 W	OHMITE	RC07GF103J

PARTS LIST

ASSEMBLY 4C347C - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION								
R88	000107	RES	CARBON	100	M	5%	1/4	W	CHMITE	RC07GF107J
R89	000107	RES	CARBON	100	M	5%	1/4	W	CHMITE	RC07GF107J
R90	000102	RES	CARBON	1	K	5%	1/4	W	CHMITE	RC07GF102J
R91	000362	RES	CARBON	3.6	K	5%	1/4	W	CHMITE	RC07GF362J
R92	040191	POT	CERMET	1	M				BECKMAN	79P
R93	040133	RES	VARI	200	K	10%			BECKMAN	79PR200K
R94	000150	RES	CARBON	15	OHM	5%	1/4	W	CHMITE	RC07GF150J
R95	000100	RES	CARBON	10	OHM	5%	1/4	W	CHMITE	RC07GF100J
R96	000303	RES	CARBON	30	K	5%	1/4	W	CHMITE	RC07GF303J
R97	000101	RES	CARBON	100	OHM	5%	1/4	W	CHMITE	RC07GF101J
R98	000163	RES	CARBON	16	K	5%	1/4	W	CHMITE	RC07GF163J
R99	000303	RES	CARBON	30	K	5%	1/4	W	CHMITE	RC07GF303J
W01	600245	JUMPER							GETTIG	L-2007-1

PARTS LIST

ASSEMBLY 403472 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
CR01	211083	DIODE	SILICO		018			DANA	211083
CR02	211083	DIODE	SILICO		018			DANA	211083
CR03	210015	DIODE			HP5082		HP	HP5082	
CR04	210015	DIODE			HP5082		HP	HP5082	
CR05	220012	DIODE	SILICO	ZENER	1N958B			MOTOROLA	1N958B
CR06	211083	DIODE	SILICO		018			DANA	211083
CR07	211083	DIODE	SILICO		018			DANA	211083
CR08	211083	DIODE	SILICO		018			DANA	211083
CR09	220012	DIODE	SILICO	ZENER	1N958B			MOTOROLA	1N958B
CR10	211083	DIODE	SILICO		018			DANA	211083
CR11	211083	DIODE	SILICO		018			DANA	211083
CR12	211083	DIODE	SILICO		018			DANA	211083
C01	130116	CAP	MICA	4000	PFD	500 V	2%	ELMENCO	DM19
C02	120275	CAP	POLY	1000	PFD	630 V	2.5%	NPC	KSO Series
C03	130115	CAP	MICA	346	PFD	500 V	2%	ELMENCO	DM15
C04	120274	CAP	POLY	87	PFD	630 V	2.5%	NPC	KSO Series
C05	100074	CAP		5	PFD	1 KV		SPRAGUE	10TCCV50
C06	100075	CAP	CERAM	10	PFD	1 KV	2%	SPRAGUE	10TCCQ10
C07	130124	CAP	CERAM	10	PFD	250 V		S-T	R-TR1K0-122-09SD
C08	100076	CAP		20	PFD	1 KV		SPRAGUE	10TCCQ20
C09	130123	CAP	CERAM	3	PFD	250 V		S-T	R-TR1K0-122-09SD
C10	100050	CAP						SPRAGUE	10TCC-V22
C11	100078	CAP	CERAM	34	PFD	500 V	5%	AEROVOX	CD-2 STYLE
C12	100077	CAP		7.5	PFD	500 V	5%	VITRAMON	VY10CA7R5JA
C13	100075	CAP	CERAM	10	PFD	1 KV		SPRAGUE	10TCCQ10
C14	100075	CAP	CERAM	10	PFD	1 KV		SPRAGUE	10TCCQ10
C15	100077	CAP		7.5	PFD	500 V	5%	VITRAMON	VY10CA7R5JA
C16	130125	CAP		10	PFD	250 V		JOHANSON	JMC2951
C17	130125	CAP		10	PFD	250 V		JOHANSON	JMC2951
C18	120090	CAP	MYLAR	.22	MFD	600 V	20%	IMB	ZA1101
C19	110126	CAP	TANTA	6.8	MFD	35 V		ITT	4312 17168
C20	130127	CAP		40	PFD			S-T	10S-TR1K0-24N750
C22	110126	CAP	TANTA	6.8	MFD	35 V		ITT	4312 17168
C23	110126	CAP	TANTA	6.8	MFD	35 V		ITT	4312 17168
C25	110140	CAP	TANTA	47	MFD	6.3 V		ITT	4-3212-12247

PARTS LIST

ASSEMBLY 403472 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION						
C26	110126	CAP	TANTA	6.8 MFD	35 V		ITT	4312 17168
C27	100017	CAP	CERAM	.01 MFD	200 V	10%	SPRAGUE	TH-S10
C28	100079	CAP		3.9 PFD			SPRAGUE	10TCCV39
C29	100100	CAP	CERAM	FSV				
C31	101174	CAP	CERAM	.001 MFD	500 V	10%	AERCVCX	SC03X5F
C32	110126	CAP	TANTA	6.8 MFD	35 V		ITT	4312 17168
C33	101174	CAP	CERAM	.001 MFD	500 V	10%	AERCVCX	SC03X5F
K01	310078	REED RELAY, SHIELD					ELECTROL	R2690-3
K02	310077	REED RELAY, SHIELD					ELECTROL	R2691-3
K03	310078	REED RELAY, SHIELD					ELECTROL	R2690-3
L01	310068	CHOKE		1 UH			DELEVAN	1537-12
Q01	200176	TRANS					FAIRCHILD	SE3005
Q02	200161	DUAL FET					LEDEL	LS3954
Q03	200176	TRANS					FAIRCHILD	SE3005
Q04	200176	TRANS					FAIRCHILD	SE3005
Q05	200176	TRANS					FAIRCHILD	SE3005
Q06	200176	TRANS					FAIRCHILD	SE3005
Q07	200176	TRANS					FAIRCHILD	SE3005
Q08	200176	TRANS					FAIRCHILD	SE3005
R01	010721	RES		MATCHED SET			IRC	RN75
R02	010720	RES	METAL	9.09 K		.25%	IRC	RN55C
R03	040195	POT		500 OHM			BECKMAN	79PR500
R04	010721	RES		MATCHED SET			IRC	RN75
R05	040176	POT	CERMET	50 OHM			BECKMAN	79PR50
R06	010721	RES		MATCHED SET			IRC	RN75
R07	040195	POT		500 OHM			BECKMAN	79PR500
R08	010721	RES		MATCHED SET			IRC	RN75
R09	010721	RES		MATCHED SET			IRC	RN75
R10	041179	POT		5 K			SPECTROL	50-1-1-502
R11	000242	RES	CARBON	2.4 K	5%	1/4 W	CHMITE	RC07GF242J
R12	000752	RES	CARBON	7.5 K	5%	1/4 W	CHMITE	RC07GF752J
R13	000510	RES	CARBON	51 OHM	5%	1/4 W	CHMITE	RC07GF510J
R14	000241	RES	CARBON	240 OHM	5%	1/4 W	CHMITE	RC07GF241J
R15	000242	RES	CARBON	2.4 K	5%	1/4 W	CHMITE	RC07GF242J
R16	010718	RES		237 OHM	1%		IRC	RN55D

PARTS LIST

ASSEMBLY 403472 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION						
R17	000822	RES	CARBON	8.2 K	5%	1/4 W	CHMITE	RC07GF822J
R18	000241	RES	CARBON	240 OHM	5%	1/4 W	CHMITE	RC07GF241J
R19	010719	RES		16.2 K	1%		IRC	RN55D
R20	010718	RES		237 OHM	1%		IRC	RN55D
R21	000510	RES	CARBON	51 OHM	5%	1/4 W	CHMITE	RC07GF510J
R22	000101	RES	CARBON	100 OHM	5%	1/4 W	CHMITE	RC07GF101J
R23	000183	RES	CARBON	18 K	5%	1/4 W	CHMITE	RC07GF183J
R24	000183	RES	CARBON	18 K	5%	1/4 W	CHMITE	RC07GF183J
R25	000102	RES	CARBON	1 K	5%	1/4 W	CHMITE	RC07GF102J
R26	000183	RES	CARBON	18 K	5%	1/4 W	CHMITE	RC07GF183J
R27	000432	RES	CARBON	4.3 K	5%	1/4 W	CHMITE	RC07GF432J
R28	000510	RES	CARBON	51 OHM	5%	1/4 W	CHMITE	RC07GF510J
R29	000160	RES	CARBON	16 OHM	5%	1/4 W	CHMITE	RC07GF160J
R30	000101	RES	CARBON	100 OHM	5%	1/4 W	CHMITE	RC07GF101J
R31	001469	RES	CARBON	1.2 K	5%	1/2 W	CHMITE	RC20GF122J
R32	000564	RES	CARBON	560 K	5%	1/4 W	CHMITE	RC07GF564J

PARTS LIST

ASSEMBLY 403436 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION					
CR01	211083	DIODE SILICO	018			DANA	211083
CR02	211083	DIODE SILICO	018			DANA	211083
CR03	211083	DIODE SILICO	018			DANA	211083
CR04	211083	DIODE SILICO	018			DANA	211083
CR05	211083	DIODE SILICO	018			DANA	211083
CR06	211083	DIODE SILICO	018			DANA	211083
CR07	211083	DIODE SILICO	018			DANA	211083
CR08	211083	DIODE SILICO	018			DANA	211083
CR09	211083	DIODE SILICO	018			DANA	211083
C01	101099	CAP CERAM	68C PFD	500 V	10%	AERCVCX	SCD2X5F
C02	110149	CAP TANTA	.39 MFD	50 V	10%	KEMET	KR39W50K
C03	110148	CAP TANTA	.22 MFD	50 V	10%	KEMET	KR22W50K
C04	110147	CAP TANTA	.18 MFD	50 V	10%	KEMET	KR18W50K
C05	121468	CAP MYLAR	.022 MFD	100 V	10%	CDE	WMF1S22
C06	100017	CAP CERAM	.01 MFD	200 V	10%	SPRAGUE	TH-S10
C07	100017	CAP CERAM	.01 MFD	200 V	10%	SPRAGUE	TH-S10
J03	920460	INTEGRATED CIRCUIT				AUGAT	314AG5D-2R
J04	920463	FUSE CLIP				AUGAT	600832AT
M01	230029	INTEGRATED CIRCUIT				TI	SN7401N
M02	230029	INTEGRATED CIRCUIT				TI	SN7401N
M03	230029	INTEGRATED CIRCUIT				TI	SN7401N
M04	230064	INTEGRATED CIRCUIT				TI	SN7404N
M05	230064	INTEGRATED CIRCUIT				TI	SN7404N
M06	230073	INTEGRATED CIRCUIT				LIBERTY	SN7405N
M07	230028	INTEGRATED CIRCUIT				TI	SN7400N
M08	230032	INTEGRATED CIRCUIT				TI	SN7420N
M09	230030	INTEGRATED CIRCUIT				TI	SN7402N
M10	230029	INTEGRATED CIRCUIT				TI	SN7401N
Q01	200037	TRANS SILICO NPN	2N3646			FAIRCHILD	2N3646
Q02	200136	TRANS				FAIRCHILD	SE4022
Q03	200136	TRANS				FAIRCHILD	SE4022
Q04	200136	TRANS				FAIRCHILD	SE4022
Q05	200136	TRANS				FAIRCHILD	SE4022
Q06	200136	TRANS				FAIRCHILD	SE4022
Q07	200088	TRANS SILICO PNP	2N4248			FAIRCHILD	2N4248

PARTS LIST

ASSEMBLY 403436 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
Q08	200037	TRANS SILICO NPN		2N3646				FAIRCHILD	2N3646
R01	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R02	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R03	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R04	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R05	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R06	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R07	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R08	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R09	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R10	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R11	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R12	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R13	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R14	000512	RES	CARBON	5.1	K	5%	1/4 W	CHMITE	RC07GF512J
R15	000102	RES	CARBON	1	K	5%	1/4 W	CHMITE	RC07GF102J
R16	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R17	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R18	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R19	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R20	000202	RES	CARBON	2	K	5%	1/4 W	CHMITE	RC07GF202J
R21	000392	RES	CARBON	0003.9	K	5%	1/4 W	CHMITE	RC07GF392J
R22	000432	RES	CARBON	4.3	K	5%	1/4 W	CHMITE	RC07GF432J
R23	000432	RES	CARBON	4.3	K	5%	1/4 W	CHMITE	RC07GF432J
R24	000101	RES	CARBON	100	OHM	5%	1/4 W	CHMITE	RC07GF101J
R25	000105	RES	CARBON	1	M	5%	1/4 W	CHMITE	RC07GF105J
R26	010676	RES	METAL	15	K	1%		IRC	RN55C
R27	010529	RES		10	K	1%		IRC	RN55D
R28	000105	RES	CARBON	1	M	5%	1/4 W	CHMITE	RC07GF105J
R29	010697	RES	METAL	26.7	K	1%		IRC	RN55D
R30	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R31	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R32	000242	RES	CARBON	2.4	K	5%	1/4 W	CHMITE	RC07GF242J
R33	000432	RES	CARBON	4.3	K	5%	1/4 W	CHMITE	RC07GF432J
R34	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J

PARTS LIST

ASSEMBLY 403436 - Model 4800 A

REF. DESIG.	PART NO.	DESCRIPTION							
R35	000103	RES	CARBON	10	K	5%	1/4 W	CHMITE	RC07GF103J
R36	000123	RES	CARBON	12	K	5%	1/4 W	CHMITE	RC07GF123J

DANA

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